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United States Department of the Interior  
Bureau of Land Management

**DRAFT**

North Dakota Field Office

April 2004

**COTEAU PROPERTIES COMPANY  
FEDERAL COAL LEASE APPLICATION  
FOR  
WEST MINE AREA, FREEDOM MINE  
MERCER COUNTY, NORTH DAKOTA  
ENVIRONMENTAL IMPACT STATEMENT**



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BLM/MT/PL-04/005



# United States Department of the Interior



BUREAU OF LAND MANAGEMENT  
North Dakota Field Office  
2933 Third Avenue West  
Dickinson, North Dakota 59601

Dear Reader,

The Bureau of Land Management (BLM) prepared this Draft Environmental Impact Statement (DEIS) to document and disclose results of an environmental analysis for leasing Federal coal in Mercer County, North Dakota.

The following public meetings will allow you to discuss any questions or concerns with BLM personnel.

**June 1, 2004, Four Bears Casino & Lodge, New Town, ND 6:30 – 8:00 p.m.**

**June 2, 2004, Civic Center (120 7 AV NE) Beulah, ND, 6:30 – 8:00 p.m.**

**June 3, 2004, Prairie Knights Casino & Lodge, Fort Yates, ND, 6:30 – 8:00 p.m.**

BLM will accept public comments on this DEIS for 60 days commencing on the date the Environmental Protection Agency publishes a Notice of Availability in the *Federal Register*.

If you wish to comment on the DEIS, your comments should relate directly to the document. We request that you make your comments as specific as possible and that you cite the section within the document you are addressing.

The draft is not a decision document; its purpose is to inform the public and agency decision makers of the impacts of leasing tracts of Federal coal and to evaluate alternatives to leasing the coal.

Please send written comments to Coal Team, Bureau of Land Management, North Dakota Field Office, 2933 Third Avenue West, Dickinson, ND 58601.

If you have any questions please contact Lee Jefferis, Project Manager (701-227-7713) or Doug Burger, Field Manager (701- 227-7703).

Sincerely,

Douglas J. Burger  
Field Manager



#55094352

ID: 88056880

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# DRAFT ENVIRONMENTAL IMPACT STATEMENT

#23-04

The Coteau Properties Company

Federal Coal Lease Application NDM 91535

For

West Mine Area, Freedom Mine, Mercer County, North Dakota

Prepared by

The Bureau of Land Management, North Dakota Field Office

In Cooperation with

The Office of Surface Mining Reclamation and Enforcement,  
Denver, Colorado

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April 20, 2004

# COTEAU PROPERTIES COMPANY

## DRAFT ENVIRONMENTAL IMPACT STATEMENT

### Abstract

Lead Agency: Bureau of Land Management, U.S. Department of the Interior

Cooperating Agency: Office of Surface Mining Reclamation and Enforcement

For Further Information Contact: Lee Jefferis, Bureau of Land Management, North Dakota Field Office, 2933 3<sup>rd</sup> Ave. W., Dickinson, ND 58601 (701) 227-7713 [e-mail: ljefferi@blm.gov]

Proposed Action: Coteau Properties Company applied for 5,571 acres of Federal coal beneath private surface in Mercer County, North Dakota.

Abstract: This EIS analyzes the environmental consequences of three Federal coal-management alternatives. The analysis was based on resource issues and concerns identified during previous coal leasing analyses and public scoping conducted for this application. Potential concerns include impacts to air quality, water resources, soils, land use, vegetation, wildlife, cultural resources, environmental justice and socio-economics. Analysis of cumulative impacts addresses on-going surface mining at the Freedom Mine, Mercer County, North Dakota.

The Proposed Action (Alternative A) considers leasing tracts as requested in the lease application. Coteau Properties Company filed an application to acquire Federal coal as maintenance tracts under Federal coal regulations at 43 CFR 3425, Leasing On Application. Under Alternative A the BLM would lease 5,571 acres of Federal coal beneath private surface. The lease tracts would be subject to standard and special lease stipulations. The coal (an estimated 90 million tons of Federal lignite) would complement reserves of the Freedom Mine.

The No Action Alternative (B) would reject the coal lease application. Federal tracts would not be leased although existing leases at the Freedom Mine would be developed according to the approved mining and reclamation plans.

Alternative C (Modified Leasing) considers leasing while providing added measures to protect cultural resources in the proposed permit area.

Alternative C is the preferred alternative.

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## ABBREVIATIONS AND ACRONYMS USED IN THIS REPORT

BLM	Bureau of Land Management
BP	Before Present
CFR	Code of Federal Regulations
CMS	Cultural material scatter
CO	Carbon monoxide
DOI	Department of Interior
dv	Deciview, a measure of view impairment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
F	Fahrenheit
ft	Foot, feet
FWS	U.S. Fish and Wildlife Service
GIS	Geographic Information Systems
HABS/HAER	Historic American Building Survey/Historic American Engineering Record
HAP	Hazardous Air Pollutant
IMPROVE	Interagency Monitoring of Protected Environments
MLA	Mineral Leasing Act of 1920
NAAQS	National Ambient Air Quality Standards
NDAAQS	North Dakota Ambient Air Quality Standards
NHPA	National Historic Preservation Act
NEPA	National Environmental Policy Act of 1969
NO <sub>2</sub>	Nitrogen dioxide
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
O <sub>3</sub>	Ozone
OSM	Office of Surface Mining Reclamation and Enforcement
PAP	Permit Application Package, as submitted to PSC
PM <sub>2.5</sub>	Particulates finer than 2.5 microns in diameter
PM <sub>10</sub>	Particulates finer than 10 microns in diameter
PSD	Prevention of significant deterioration
PVT	Private (Fee)
PSC	Public Service Commission, State of North Dakota
RMP	Resource Management Plan
SHPO	State Historic Preservation Office
SHSND	State Historical Society of North Dakota
SIP	State Implementation Plan
SMCRA	Surface Mining Control and Reclamation Act of 1977
SO <sub>2</sub>	Sulfur dioxide
TCP	Traditional Cultural Property
T&E	Threatened and Endangered
THPO	Tribal Historic Preservation Office
TRNP	Theodore Roosevelt National Park
WMA	West Mine Area; permit area analyzed in this document



# SUMMARY

This Environmental Impact Statement (EIS) identifies and analyzes potential environmental effects that could result from leasing tracts of Federal coal adjacent to the Freedom Mine, Mercer County, North Dakota. The mine operator (Coteau Properties Company) filed an application to acquire Federal coal as maintenance tracts under Federal coal regulations at 43 CFR 3425, Leasing On Application.

The purpose of this EIS is to disclose potential environmental and socio-economic impacts from leasing and mining coal in the West Mine Area, Mercer County, North Dakota. The need is to acquire Federal coal reserves to be mined in conjunction with adjacent private reserves resulting in conservation of the coal resource and to supply existing contracts.

The Bureau of Land Management (BLM) prepared this EIS to evaluate site-specific and cumulative environmental and socio-economic impacts within and around the proposed permit area. Although BLM does not authorize coal mining (which is regulated by the State of North Dakota and Federal Office of Surface Mining), impacts of mining are considered because they are a logical consequence of issuing a coal lease.

BLM will use the EIS to decide whether to hold a lease sale and issue a lease for Federal coal in the proposed permit area. The sale would be open to any bidder, not only the applicant. A Federal coal lease would be issued to the high bidder as long as a committee determines that the high bid meets the fair-market value of the coal.

The following items are briefly noted:

- Office of Surface Mining (OSM) is a cooperating agency on this EIS and will use the findings to make decisions related to mining the tracts, if leased.
- Lands in the proposed permit area were subject to four coal-planning screens and determined as acceptable for consideration for leasing.
- Scoping was conducted from March 6, 2003 through April 7, 2003. A Notice of Scoping and Notice of Intent to Prepare an EIS was published in the Federal Register on March 6, 2003. Over 190 letters were mailed to interested parties on March 11, 2003.
- The Leasing On Application process is, by law and regulation, an open, public, competitive, sealed-bid process. The applicant may or may not be the successful high bidder. This analysis (EIS) assumes the applicant would be the successful bidder and that each tract would be mined as a maintenance tract for the Freedom Mine.
- The major coal seam within the permit area is the Beulah-Zap bed, which is 15-22 feet thick, except near

the edges of glacial diversion channels. The coal bed dips west at less than one degree and lies beneath overburden ranging from a few feet on the east to nearly 200 feet on the western border.

This EIS analyzes Coteau's Proposed Action and two alternatives for managing Federal coal. The Proposed Action (Alternative A) considers leasing the tracts as requested in the lease application. Alternative B (No Action) considers rejecting the lease application, although existing leases at the Freedom Mine would be developed according to approved mining and reclamation plans. Alternative C considers leasing while providing added protection to cultural resources.

Critical elements of the human environment that could be affected by the proposed action include: cultural resources including American Indian concerns, threatened and endangered species, air quality, water quality, prime and unique farmland, invasive nonnative species, wetlands/riparian zones, and environmental justice. Five critical elements, including: Areas of Critical Environmental Concern, wilderness, floodplains, wild and scenic rivers, and hazardous wastes, are not present in the permit area and are not addressed. In addition to critical elements, the EIS discusses potential impacts on soils, alluvial valley floors, vegetation, wildlife, land use, and socio-economics.

There would be significant impacts on cultural resources under all three alternatives. Because the surface is privately owned and the Federal coal reserves are not contiguous, activities associated with mining would destroy a significant number of prehistoric American Indian stone features whether or not Federal coal is leased. Through consultation with Tribal representatives it was determined that mining of the coal would affect the Hidatsa, Mandan, Arikara, Sioux, and Assiniboine. These Tribes have well documented historic ties to the area.

Alternative C, the preferred alternative, incorporates a preservation component for the prehistoric American Indian stone features. Developed out of Tribal consultations, this alternative sets aside approximately 1,325 acres, 14 Historic Properties, 38 sites, 327 stone rings, 93 stone cairns, 11 stone alignments, one stone effigy and seven burials. \$200,000 would be set aside in an American Indian Education Trust. The alternative provides for investigations of the archeological information contained in the remaining features.

Leasing would extend the projected lifetime of Freedom Mine without an annual increase in production. Economic stability would be maintained in the communities in this area without placing major additional demands on the existing infrastructure or services.



# 1.0 PURPOSE OF AND NEED FOR ACTION

This EIS analyzes effects anticipated from leasing Federal coal adjacent to the Freedom Mine, Mercer County, North Dakota (see Figure 1.1).

Acquiring Federal coal would be part of Coteau's plan to keep the Freedom Mine operating into the 2030s.

## 1.1 PURPOSE AND NEED FOR ACTION

On January 16, 2002, Coteau filed an application with BLM to lease Federal coal deposits beneath private surface at the following locations:

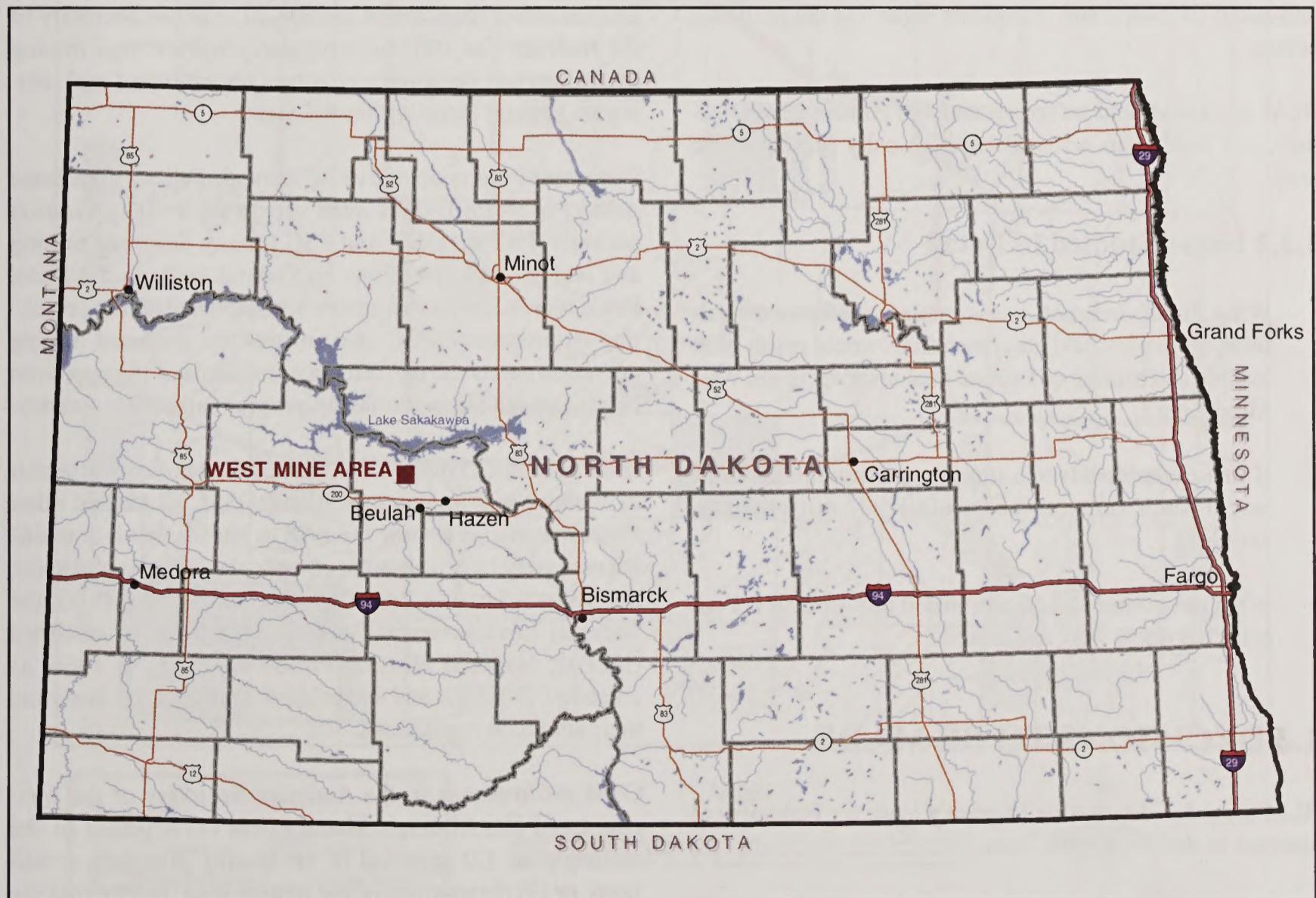
T. 144 N., R. 88 W., 5<sup>th</sup> P.M.  
Sec. 2: Lots 3, 4, S<sup>1/2</sup>NW<sup>1/4</sup>  
Sec. 4: Lots 1, 2, S<sup>1/2</sup>NE<sup>1/4</sup>, S<sup>1/2</sup>  
Sec. 6: All  
Sec. 8: N<sup>1/2</sup>NE<sup>1/4</sup>, SE<sup>1/4</sup>NE<sup>1/4</sup>, NW<sup>1/4</sup>, N<sup>1/2</sup>SW<sup>1/4</sup>

T. 144 N., R. 89 W., 5<sup>th</sup> P.M.  
Sec. 12: E<sup>1/2</sup>

T. 145 N., R. 88 W., 5<sup>th</sup> P.M.  
Sec. 4: Lots 1, 2, 3, 4, S<sup>1/2</sup>N<sup>1/2</sup>, SE<sup>1/4</sup>, S<sup>1/2</sup>SW<sup>1/4</sup>  
Sec. 10: N<sup>1/2</sup>  
Sec. 14: All  
Sec. 22: All  
Sec. 26: N<sup>1/2</sup>NE<sup>1/4</sup>, SW<sup>1/4</sup>NE<sup>1/4</sup>, NW<sup>1/4</sup>SE<sup>1/4</sup>, W<sup>1/2</sup>  
Sec. 28: E<sup>1/2</sup>NE<sup>1/4</sup>, SW<sup>1/4</sup>NE<sup>1/4</sup>, SE<sup>1/4</sup>NW<sup>1/4</sup>, S<sup>1/2</sup>  
Sec. 34: N<sup>1/2</sup>N<sup>1/2</sup>, SE<sup>1/4</sup>NE<sup>1/4</sup>, E<sup>1/2</sup>SE<sup>1/4</sup>, SW<sup>1/4</sup>SE<sup>1/4</sup>, SW<sup>1/4</sup>.

5,571 Acres Federal Coal, Mercer County, North Dakota.

**Figure 1.1**  
**West Mine Area, Mercer County, North Dakota**



BLM proposes to lease the above-listed tracts as part of a 17,000-acre expansion, the West Mine Area (WMA) of the Freedom Mine (Figure 1.2). The need is to acquire Federal coal reserves to be mined along with adjacent private reserves. Coteau would (1) maintain annual production at the current rate of 15-16 million tons/year, (2) meet existing contracts (3) conserve the coal resource.

## 1.2 SCOPE OF THE ANALYSIS

Leasing of Federal coal reserves is analyzed at the local (field office) level. Information on anticipated activities and impacts are considered appropriate for the scope of the proposed action and the likely environmental impacts of the operation.

### 1.2.1 History of Scoping and Public Participation

Scoping was begun on March 6, 2003 when BLM published a Notice of Intent to prepare a NEPA document in the *Federal Register*.

The project leader sent over 190 letters to interested parties on March 11, 2003. The letters explained Coteau's proposal and asked for issues and comments regarding the proposed action.

BLM and OSM held informational and consultation meetings, and field visits with tribes historically present in the area.

### 1.2.2 Issues Studied in Detail

- What direct, indirect, and cumulative effects on cultural, air quality, and other resources would result from leasing and mining of Federal coal reserves in the West Mine Area?
- If unacceptable adverse impacts are anticipated, how might such impacts be minimized, mitigated or avoided?
- What environmental effects would likely occur if Federal coal tracts were not leased?

## 1.3 DECISIONS TO BE MADE

BLM must decide whether to grant a lease for Federal coal reserves in the West Mine Area.

BLM must decide whether to (1) hold a competitive, sealed-bid lease sale for the tracts as applied for, (2) hold a com-

petitive sealed-bid lease sale for a modified tract configuration, or (3) reject the lease application and offer no tracts in the WMA at this time.

The Office of Surface Mining Reclamation and Enforcement (OSM), a cooperating agency on this EIS, must recommend (1) approval, (2) approval with conditions, or (3) disapproval of the mining plan (if leased) that a successful bidder would submit.

## 1.4 REGULATORY AUTHORITY AND RESPONSIBILITY

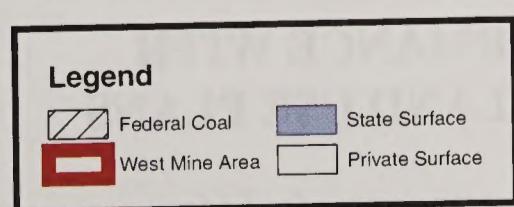
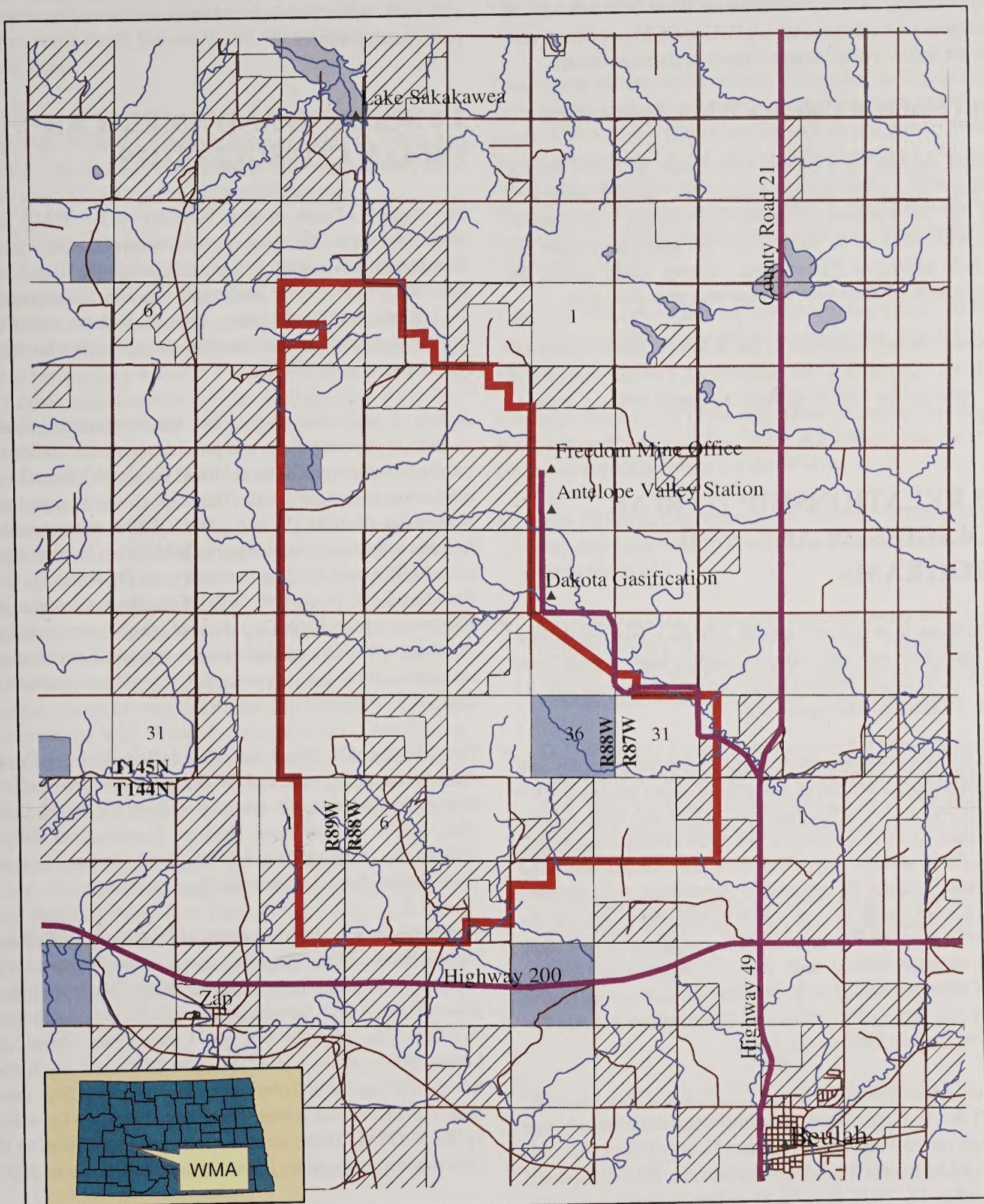
The Surface Mining Control and Reclamation Act of 1977, as amended (SMCRA), gives OSM primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations in the United States. Pursuant to Section 503 of SMCRA, the North Dakota Public Service Commission (PSC) developed, and the Secretary of the Interior approved, North Dakota's permanent regulatory program. This authorized the PSC to regulate surface coal mining operations and the surface effects of underground coal mining on private and State lands within the State of North Dakota. In August 1983, pursuant to Section 523(c) of SMCRA, PSC entered into a cooperative agreement with the Secretary of the Interior. The PSC now regulates surface coal mining operations and the surface effects of underground coal mining on Federal lands within the State.

Pursuant to the cooperative agreement, Federal coal lease holders in North Dakota must submit a permit application package (PAP) to OSM and PSC for any proposed mining and reclamation operations on Federal lands in the State. PSC reviews the PAP to ensure it complies with the permitting requirements. PSC also ensures the proposed mining operation meets the performance standards of the approved North Dakota State permanent program and other statutes.

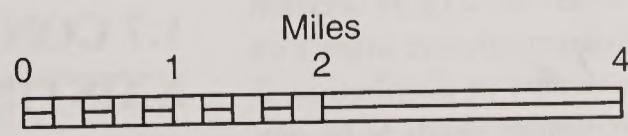
If the PAP does comply, PSC issues the applicant a permit to conduct coal mining operations. OSM, BLM, and other Federal agencies review the PAP to ensure that it contains the necessary information for compliance with the coal lease; the Mineral Leasing Act of 1920, as amended (MLA); the National Environmental Policy Act of 1969, as amended (NEPA); National Historic Preservation Act of 1966, as amended (NHPA); and other applicable Federal laws and their attendant regulations.

OSM recommends to the Assistant Secretary of the Interior, Land and Minerals Management (1) approval of the mining plan, (2) approval of the mining plan with conditions, or (3) disapproval of the mining plan. Before making a recommendation on the mining plan, OSM would obtain input from other Federal agencies, including BLM.

**Figure 1.2**  
**Setting of the West Mine Area showing location of Federal Coal Tracts**



Surface estate of the WMA is entirely non-Federal.



No warranty is made by the BLM for the use of the data for purposes not intended by BLM

PSC enforces the performance standards and permit requirements during the mine's operation and has primary authority in environmental emergencies. OSM retains oversight responsibility of this enforcement. BLM has authority in emergency situations in which PSC or OSM inspectors cannot act before environmental harm or damage occurs.

#### **1.4.1 Status of Coteau's WMA Application**

Coteau applied for a Federal Coal Lease (NDM-91535) in January 2002. Concurrently, Coteau filed an application with the PSC for a permit to conduct coal mining operations in the West Mine Area. At present, that application does not include mining of Federal coal. Coteau would update the application if/when Federal coal becomes available.

Because the surface estate of the WMA is entirely non-Federal (see Appendix B for ownership), Federal approval is not required for PSC to approve Coteau's pending application.

#### **1.5 RELATIONSHIP TO BLM POLICIES, PLANS, AND PROGRAMS**

In addition to acts listed above, guidance and regulations for managing and administering public lands are set forth in 40 CFR 1500 (Protection of the Environment), and 43 CFR 3400 (Coal Management).

The BLM's cultural resource management program and consideration of effects to cultural resources are guided primarily by law (NHPA), regulation (36 CFR 800), related guidance, and BLM Cultural Resource Manuals and Handbook (8100 series). North Dakota is not a participant in the National Cultural Programmatic Agreement and therefore must comply with current Section 106 regulations of the National Historic Preservation Act. As the proposed lease is on privately owned lands many of the laws and Executive Orders pertaining to Federal lands, such as the Native American Graves Protection and Repatriation Act and Executive Order 13007 do not apply.

As put forth in Executive Order 13212, dated May 18, 2001, all BLM decisions must take into consideration adverse impacts on the President's National Energy Policy. According to BLM Instruction Memorandum No. 2002-053, dated December 12, 2001, it is BLM policy to prepare a Statement of Adverse Energy Impact whenever a BLM decision or action will have a direct or indirect adverse impact on energy development, production, supply or distribution. If there is no adverse impact, no Statement needs to be prepared. However, the Record of Decision must note this fact.

The No Action Alternative (rejection of Coteau's lease application) could adversely affect energy production when Federal coal tracts are bypassed. However, the action alternatives (to lease Federal coal reserves) would have no adverse energy impact.

#### **1.6 SCOPING AND AMERICAN INDIAN CONSULTATION**

The imprint of past peoples is found on the WMA landscape mainly in the form of stone features: rings, cairns, alignments, and a single effigy and petroglyph. These stone features, which dot the landscape, mark locations used by the ancestors of the Mandan, Arikara, Hidatsa, and, later, the Yanktonai Sioux and other nomadic groups who moved into the area in the 1700s.

In June of 2000 Ethnoscience, Inc. was contracted by Coteau to conduct investigations and provide recommendations regarding Traditional Cultural Values for the WMA and adjacent mine extension areas. That report was completed in September of 2001 (Deaver 2001). Tribal representatives had conversations concerning the WMA with Federal Agencies, SHPO, and PSC earlier that year. On April 11, 2000 Standing Rock Sioux Tribe's THPO facilitated a meeting in Bismarck which began a series of meetings/consultation meetings, site visits, individual consultations, conversations, and correspondence concerning the WMA that continue today.

Fort Berthold's Three Affiliated Tribes, Fort Peck's Assiniboine and Sioux, and the Standing Rock Sioux Tribe have participated in consultation, as have the BLM, OSM, PSC, North Dakota State Historic Preservation Officer, Coteau, the Advisory Council On Historic Preservation and the National Trust for Historic Preservation.

American Indian Tribes consulted include Fort Belknap, Oglala Sioux Tribe, Rosebud Sioux Tribe, Santee Sioux Tribe of Nebraska, Yankton Sioux Tribe, Flandreau Santee Sioux Tribe, Turtle Mountain Band of Chippewa Indians, Northern Cheyenne Tribe, Crow Creek Sioux Tribes, and Lower Brule. BLM and OSM have held over six formal group meetings with Tribal representatives and four meetings with individual Tribes. There have been two field tours by BLM/OSM. These consultations are in addition to the information gathered by Ethnoscience, Inc. (Deaver 2001).

#### **1.7 CONFORMANCE WITH EXISTING LAND USE PLANS**

Four land-use-planning screens for Federal coal were employed in BLM's North Dakota Resource Management Plan

and Environmental Impact Statement (Record of Decision signed April 1988): (a) coal development potential, (b) unsuitability criteria, (c) multiple-use tradeoffs, and (d) surface-owner consultation. Screening ensures that leasing conforms to the North Dakota Field Office's Resource Management Plan.

The interdisciplinary team revisited the land-use planning screens after receiving Coteau's lease application. One unsuitability criterion and one multiple-use tradeoff were addressed after reviewing Coteau's application.

Alluvial Valley Floors were originally evaluated for Coal Study Areas in the North Dakota Resource Management Plan. Portions of sections 26 and 28, T. 145 N., R. 88 W. in the WMA were identified as preliminary Alluvial Valley Floors in a 1983 study. Based on that study, areas designated as preliminary Alluvial Valley Floors were excluded from further consideration for coal leasing in the 1988 Resource Management Plan.

Current North Dakota surface coal mine regulations require companies to make an Alluvial Valley Floor determination and submit such findings to the North Dakota Public Service Commission. PSC makes a determination on the existence of an Alluvial Valley Floor prior to mine-permit application. Coteau conducted an Alluvial Valley Floor study for the WMA, which included contiguous downstream areas that could be affected by surface mining activities. No Alluvial Valley Floors were found in the West Mine or adjacent areas, which includes all nominated Federal coal tracts. PSC concurred with Coteau's determination. Therefore, a maintenance action was completed for the Resource Management Plan, removing the "unsuitable designation" for sections originally considered to be Alluvial Valley Floors.

Portions of sections 4, 22, 28, T. 145 N., R. 88 W., had Federal coal excluded from consideration for leasing under the "Steep Slope Multiple-Use Tradeoff" in the North Dakota Resource Management Plan. Alternative C, the selected alternative of the Resource Management Plan, stated that concentrations of steep slopes (generally areas of 40 acres or

more with slopes at or greater than 30 percent) would be excluded from further consideration for coal leasing. During the 1988 analysis, technological capability did not allow for a thorough analysis of each parcel under consideration.

These areas should not have been designated as "excluded from further consideration for leasing" because of steep slopes. GIS analysis shows locales with slopes greater than 30 percent in WMA are small and widely scattered with no individual areas of 40 acres in size. Therefore, a Resource Management Plan maintenance action was completed, which removed steep-slope designation for all areas over Federal coal in the WMA.

Based on these two planning screen modifications, BLM has determined the entire WMA is considered suitable for leasing.

Planners with the City of Beulah, Mercer County, Standing Rock Sioux Tribe, and The Three Affiliated Tribes were contacted regarding plans for the WMA:

- John Phillips, City planner for Beulah, ND, reported that they have no conflicts and no plan that extends as far as the WMA.
- Richard Sorenson, Planner for Mercer County, ND, said Coteau brought a proposal before the Planning and Zoning Board in March 2003. The County Commissioners approved Coteau's plan in April 2003.
- Del LeCompte, Land Coordinator for the Standing Rock Sioux Tribe, reported that he is not aware of any plans that cover the WMA. He said that their plans deal largely with land consolidation and management on the reservation.
- Anet Youngbird, Realty Specialist for the Three Affiliated Tribes, reported they have no current land-use plans that cover the WMA.



# **2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION**

## **2.1 HISTORY OF ALTERNATIVE DEVELOPMENT**

The alternative development process began in February 2003 when the decision to prepare an EIS was made. Alternative development was initiated with a series of Interdisciplinary Team meetings. The team developed three alternatives within constraints imposed by existing policy and guidance.

The Proposed Action (Alternative A) is to hold a competitive lease sale for Federal coal tracts in the WMA. The Proposed Action assumes the applicant (Coteau) would be the successful bidder and that tracts would be mined as a maintenance lease for the Freedom Mine.

The No Action alternative (B) assumes the lease application would be rejected and Federal tracts withheld from leasing. Some 11,480 acres (about 60%) of the WMA is underlain by non-Federal coal, which could be mined even if Federal coal is not leased. Mining of non-Federal coal could have substantial impacts on private surface lands above Federal coal.

The modified leasing alternative (C) considers ways of preserving, mitigating, and minimizing impacts to cultural resources, which are meaningful to American Indian Tribes of the Great Plains and the historic-preservation community.

## **2.2 MANAGEMENT COMMON TO ALL ALTERNATIVES**

Coteau would mine non-Federal coal of the WMA, including some 11,480 acres of private and state-owned reserves. Historic properties affected by coal mining would be mitigated under North Dakota State Law (North Dakota Century Code) in concert with SMCRA requirements.

Through year 2000 approximately 220 million tons of lignite coal had been removed from the Freedom mine, averaging 15-16 million tons/year. Surface disturbances associated with coal extraction are present as follows:

- Previously mined area (to yearend 2002): 16,400 acres
- Active mine area (at yearend 2002): 3,106 acres
- Area completely reclaimed (yearend 2002): 8,425 acres
- Area mined and regraded without respread soil (at year end 2002): 404 acres

- Areas in long-term use, including office/shop, coal handling, haul roads, stockpiles, and ponds (to yearend 2002): 4,465 acres

BLM would comply with laws, regulations, acts, Executive Orders, policy, and formally adopted agreements as described in sections 1.4 and 1.5.

## **2.3 ALTERNATIVE A (PROPOSED ACTION)**

Coteau proposes to lease 5,571 acres of Federal coal beneath private surface in Mercer County, North Dakota. The coal (an estimated 90 million tons of Federal lignite) would complement reserves of the Freedom Mine. Lease tracts would be subject to standard and special lease stipulations developed for this sale. Under this action, physical disturbance of a Traditional Cultural Property (turtle effigy) and the only recorded unmarked burial would be stipulated for "No Surface Disturbance." To abide by the NHPA of 1966, as amended, 13 Historic Properties located over Federal coal would be avoided or mitigated for their potential to yield scientific contributions to prehistory. Archeological investigations are planned on 26 other Historic Properties located over non-Federal coal within the WMA.

## **2.4 ALTERNATIVE B (NO ACTION)**

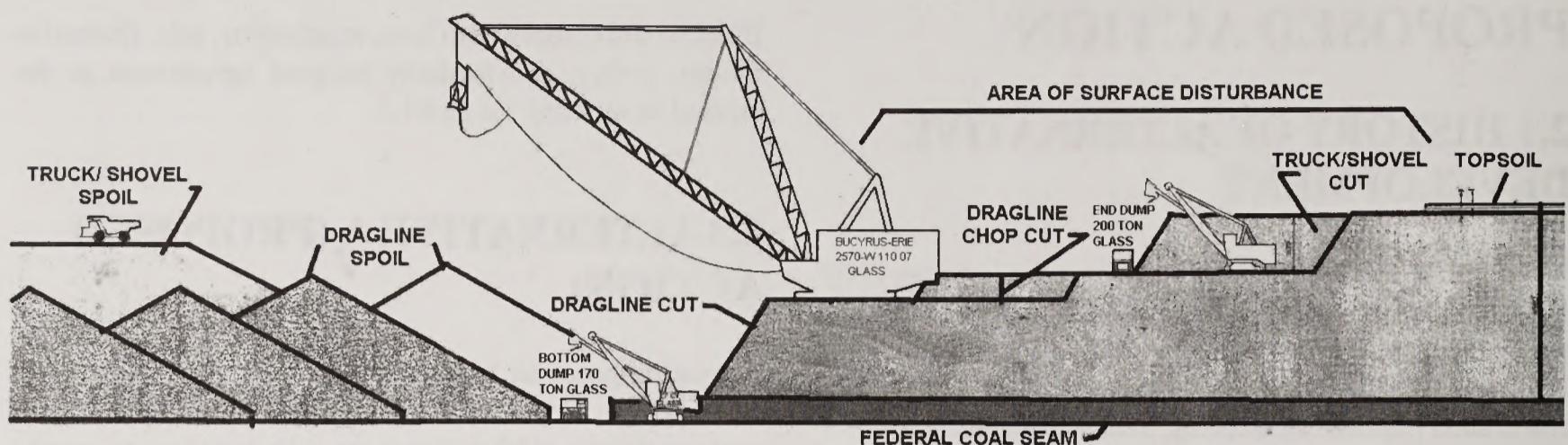
Under Alternative B the application to lease Federal coal would be rejected and Federal coal reserves bypassed during mining. Private surface over Federal coal would still be affected (for example, by highwall layback, topsoil stockpiles, haul roads and other activities) as 11,480 acres of non-Federal coal are mined.

The most severe surface impacts would occur in a 500-foot wide zone lying adjacent to the highwall (Figure 2.1). Mining would directly affect some 250 acres (roughly 40% of a 640-acre section) of surface surrounded on all sides by an open pit.

Analysis of an unleased Federal section, situated adjacent to an open pit, indicates that approximately one half the section would experience direct impacts. Another 40 percent would experience indirect impacts (roads, topsoil piles), while approximately 10 percent would remain undisturbed. Figure 2.2 indicates potential impacts that could occur on unleased lands adjacent to the mining operation.

Historic Properties located on private and state land would be mitigated under the North Dakota Century Code in concert with the requirements of SMCRA as set forth in the North Dakota coal program. All Historic Properties would remain in private ownership and use. The only recorded

**Figure 2.1**  
**Private surface above unmined Federal coal would go through substantial disturbances**



unmarked burial would be protected from disturbance under North Dakota Century Code (Citation: §23-06-27, Section Title: Protection of human burial sites, human remains and burial goods).

## 2.5 ALTERNATIVE C (MODIFIED LEASING)

BLM would lease 5,571 acres of Federal coal beneath private surface. Under an existing Programmatic Agreement and its approved Management Plan, the W<sup>1/2</sup> Section 4, T. 145 N., R. 88W. would be offered for lease with the surface stipulated as "No Surface Disturbance to protect significant sites." Likewise, Section 14 T. 145 N., R. 88W. would be offered for lease, with eight acres stipulated as "No Surface Disturbance" to protect the Traditional Cultural Property (effigy) and the only recorded unmarked burial site.

This alternative also includes a donation of lands and monies by the lessee to a recently established North Dakota State Indian Cultural Education Trust. The trust was established for the purpose of generating income to benefit Indian cultural education. By donating lands to the trust, a segment of the cultural landscape and the archeological sites they contain would be preserved. These sites, which would be transferred from private ownership into the trust, would become readily accessible to American Indians.

Donor agreements would provide for a donation of lands into the trust containing four of the 13 Historic Properties located above Federal coal. The only recorded Traditional Cultural Property (effigy) and unmarked burial would also be preserved. In addition, lands holding seven Historic Properties located above private or state coal would be donated to the trust with similar provisions. Sixteen non-National Register eligible sites would also be preserved. Nine other Historic Properties located above Federal coal would be mitigated through planned archeological investigations in conjunction with 19 other Historic Properties of the WMA. Donor Agreements would put 1,720 acres into the Education Trust, preserving 29 archeological sites, a Traditional Cultural Property, an unmarked burial, and 439 stone rings, cairns, alignments, and stone lined depressions.

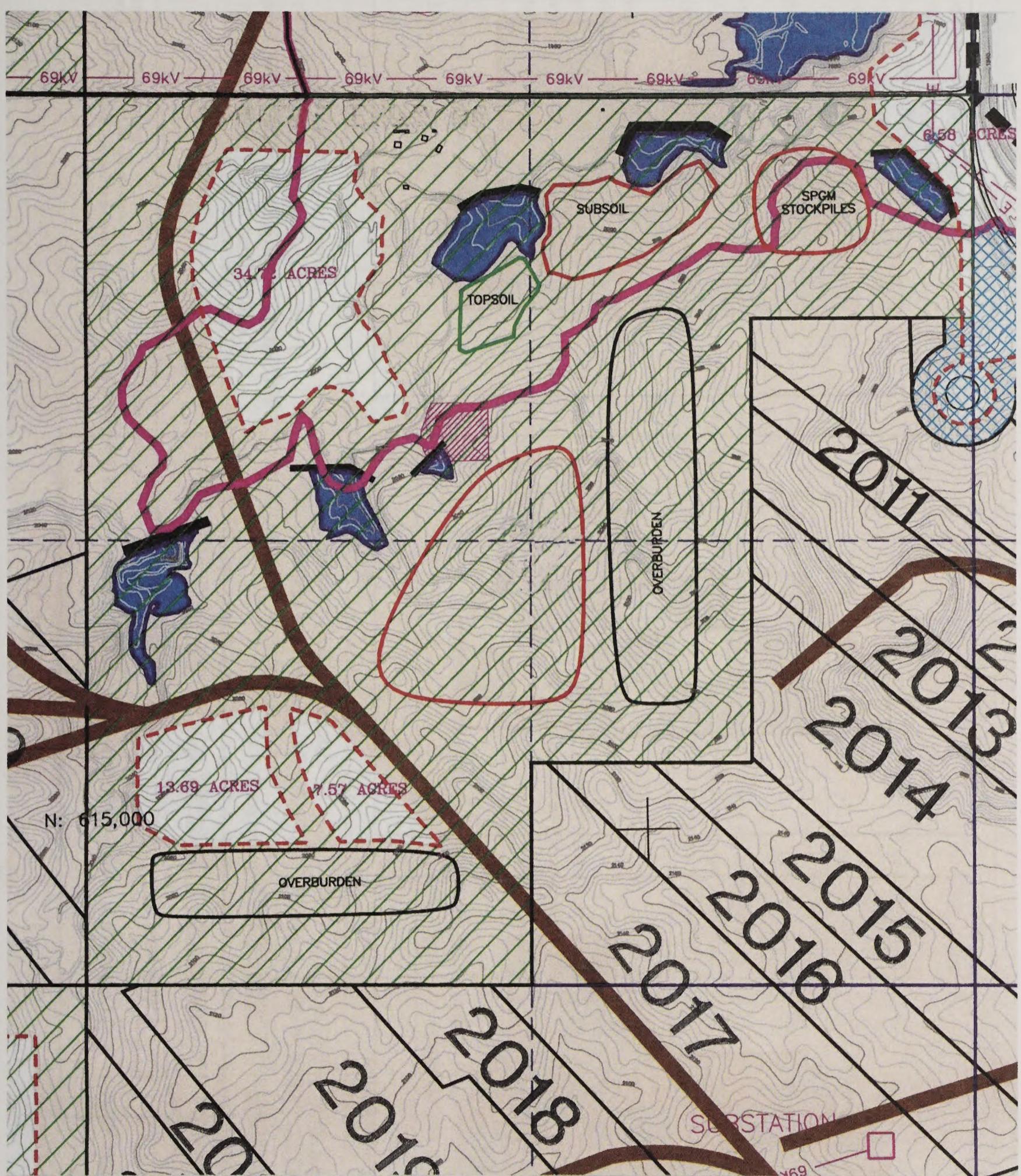
## 2.6 SUMMARY COMPARISON OF ALTERNATIVES

See Tables 2.1 through 2.3.

## 2.7 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

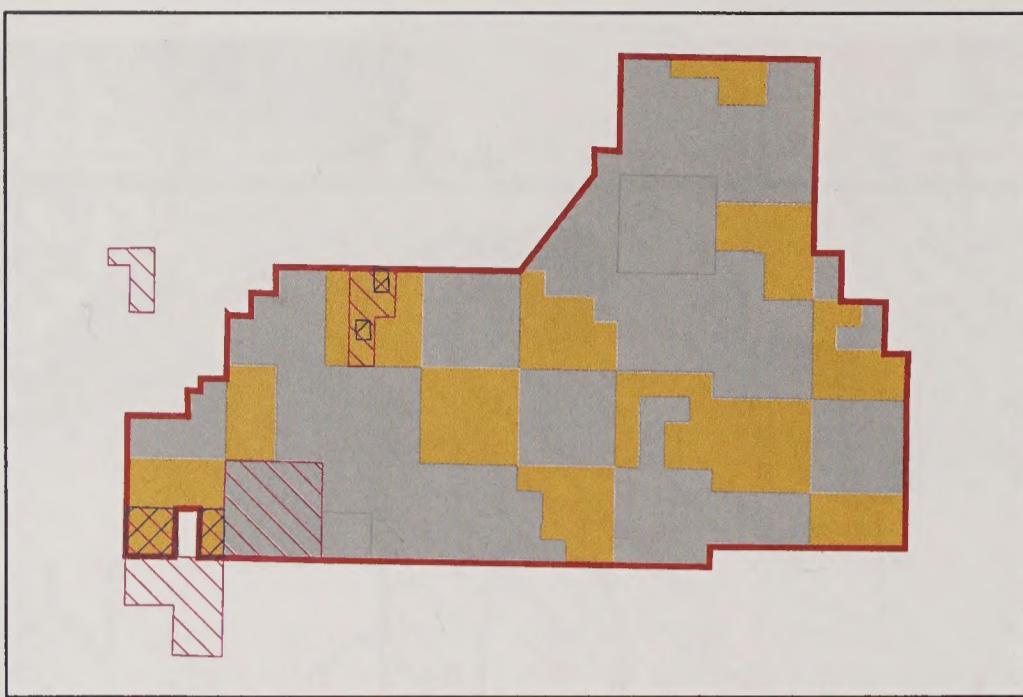
Alternative C is the Preferred Alternative.

**Figure 2.2**  
**Hypothetical impacts on an unleased Federal Coal Tract**



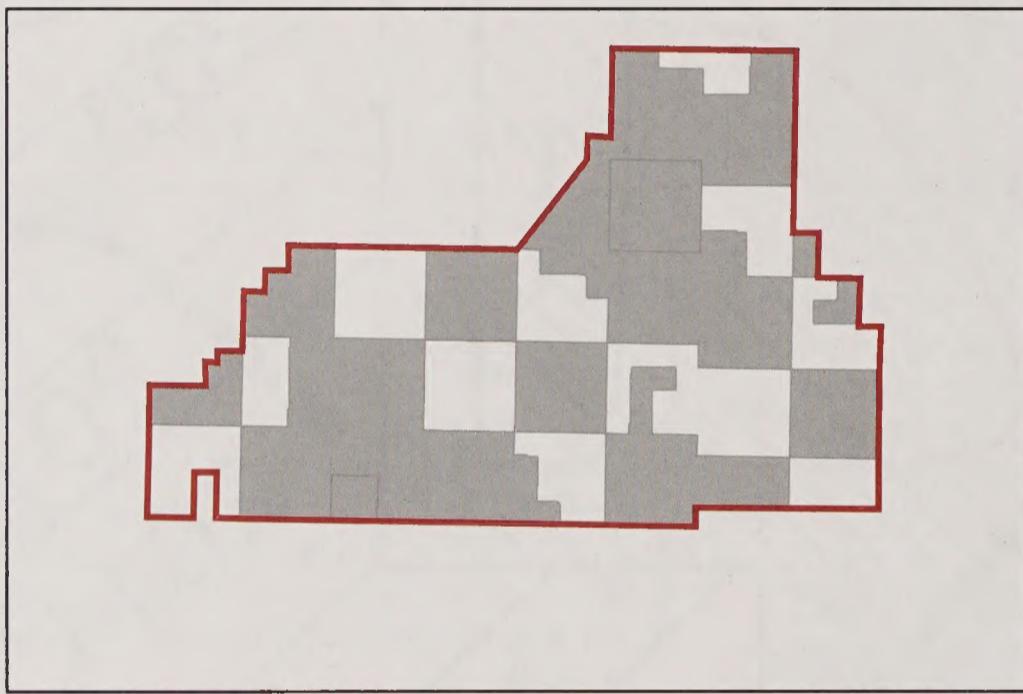
In addition to the 500-foot-wide zone of direct impacts, surface disturbances might include sedimentation ponds (blue), top/subsoil piles (red and green), and haul roads (brown). It is estimated that a “substantial” portion (up to 90%) of the surface unovered coal would be affected.

**Figure 2.3**  
**Comparison of Impacts According to Alternative**

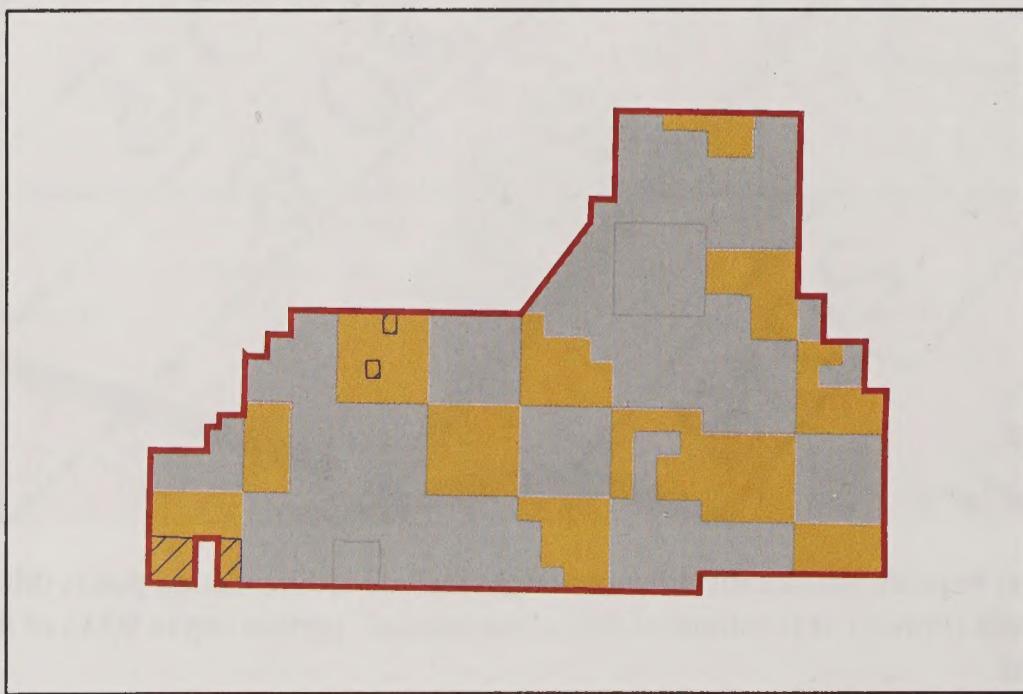
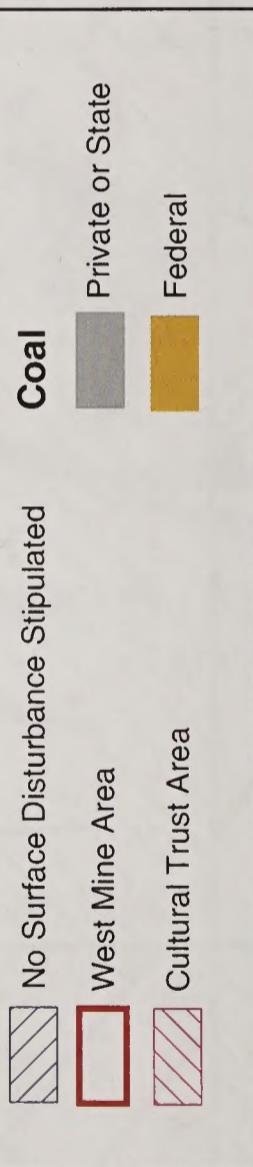


Alternative C, Preferred  
Federal Coal Leased (5,571 Acres)  
No Surface Disturbance Stipulated (248 Acres)  
Cultural Trust Areas (1,720 Acres)

No warranty is made by the BLM for the use of the  
data for purposes not intended by BLM



Alternative B, No Action  
No Federal Coal Leased



Alternative A, Proposed Action  
Federal Coal Leased (5,571 Acres)  
No Surface Disturbance Stipulated (248 Acres)

**Table 2.1**  
**Summary Comparison of Alternatives**

Indicator/Action	Alternative A Proposed Action	Alternative B No-Action	Alternative C Modified Leasing
<b>Management in Common:</b>			
11,480 acres of non-Federal coal would be mined. Approximately 220 million tons (from 16,000 acres) have been mined beginning in 1983. Historic Properties affected by coal mining would be mitigated under the North Dakota Century Code in concert with SMCRA requirements. Lease tracts would be subject to standard and special lease stipulations.			
Acres/Estimated reserves of Federal coal leased beneath private surface	5, 571 acres/ 90 million tons	0 acres/ 0 tons	5,571 acres/ 90 million tons)
Federal coal withdrawn from leasing	0 acres	5,571 acres	0 acres
Federal coal leased but subject to “No Surface Disturbance” to protect cultural resources	248 acres (see Alternative C for legal description)	0 acres	240 acres in Sec. 4, T. 145 N., R. 88 W 8 acres in Sec. 14, T. 145 N., R. 88 W.
Historical Properties over Federal coal	5 properties would be avoided; 9 properties would be investigated for their information value.	5 properties would be avoided; 9 properties would be investigated for their informational value.	6 properties donated to the ND State Indian Cultural Education Trust (includes Bee’s Nest site which is outside of the WMA). 9 properties would be investigated for their informational value.
Historical Properties over non-Federal coal	7 properties would be avoided; 20 properties would be investigated for their information value.	7 properties would be avoided; 20 properties would be investigated for their information value.	9 properties donated to the ND State Indian Cultural Education Trust (includes Boeckel-Renner site which is outside of the WMA). 20 properties would be investigated for their information value.
Additional Compensation for cultural resource losses.	None.	None.	\$200,000 (more or less) donated to the ND State Indian Cultural Education Trust. 1085 additional private acres subject to “No Surface Disturbance”. 26 non-National Register sites donated to the Trust.

**Table 2.2**  
**Summary Comparison of Magnitude and Duration of Direct and Indirect Impacts for No-Action,  
Proposed Action, and Alternative C (Modified leasing)**

Description of Potential Impacts by Resource Resource Name	Magnitude and Duration of Impact	
	No-Action Alternative (B)	Proposed Action (A) and Alternative C
<b>Air Quality</b> IMPACTS ASSOCIATED WITH MINING OPERATIONS would include: Elevated concentrations of particulate matter Elevated concentrations of gaseous emissions	Moderate, short term on active mine areas Moderate, short term on active mine areas	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas
<b>Water Resources</b> IMPACTS ASSOCIATED WITH MINING OPERATIONS would include: <i>Surface Water</i> Disruption of surface drainage systems Increased runoff and erosion rates	Moderate, short term on active mine area Moderate, short term near active mine area	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas
<i>Ground Water</i> Removal of shallow aquifers Replacement of shallow aquifers with spoil aquifers Depressed water levels in aquifers adjacent to mine Change in groundwater quality in backfilled areas	Moderate, short term on active mine area Moderate, long term on disturbed areas Moderate, short term near active mine area Moderate, long term near active mine area	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas
<b>Soils</b> IMPACTS ASSOCIATED WITH MINING OPERATIONS would include: Loss of soil productivity Soil instability and increased erosion Disturbance of prime farmland	Moderate, short term on active mine areas Moderate, short term on active mine areas Moderate, short term on active mine areas	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas
<b>Land Use/Vegetation</b> PROGRESSIVE LOSS OF NATIVE VEGETATION would result in: Increased erosion Wildlife and livestock habitat loss Wildlife habitat carrying-capacity loss	Moderate, short term on active mine areas Moderate, short term on active mine areas Moderate, short term on active mine areas	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas

Description of Potential Impacts by Resource	Magnitude and Duration of Impact		
	Resource Name	No-Action Alternative (B)	Proposed Action (A) and Alternative C
AFTER RECLAMATION the following could result:			
Changes in vegetation patterns:	Moderate, short term on active mine areas	Same as No-Action on expanded mine areas	Same as No-Action on expanded mine areas
Reduction in vegetation diversity	Moderate, short term on active mine areas	Same as No-Action on expanded mine areas	Same as No-Action on expanded mine areas
<b>Wildlife</b>	DURING MINING the following could occur:		
Wildlife displacement	Moderate, short term on active mine areas	Same as No-Action on expanded mine areas	Same as No-Action on expanded mine areas
Increased mortality rate of small mammals, amphibians, and reptiles	Moderate, short term on active mine areas	Same as No-Action on expanded mine areas	Same as No-Action on expanded mine areas
Temporary displacement of mammals, amphibians, reptiles, and birds	Moderate, short term on active mine areas	Same as No-Action on expanded mine areas	Same as No-Action on expanded mine areas
Loss of habitat for migratory birds	Moderate, short term on active mine areas	Same as No-Action on expanded mine areas	Same as No-Action on expanded mine areas
Reduction in waterfowl resting and feeding habitat	Moderate, short term on active mine areas	Same as No-Action on expanded mine areas	Same as No-Action on expanded mine areas
Temporary wildlife habitat loss	Moderate, short term on active mine areas	Same as No-Action on expanded mine areas	Same as No-Action on expanded mine areas
Continued road kills by mine-related traffic	Moderate, short term on active mine areas	Same as No-Action on expanded mine areas	Same as No-Action on expanded mine areas
<b>Cultural</b>	IMPACTS ASSOCIATED WITH MINING OPERATIONS would include:		
	Loss of 91 sites (14 are NR eligible); 624 stone features (rings, cairns, and alignments); and 5,323 acres of cultural landscape.	Major, long term on active mine areas	Same as No-Action on expanded mine areas Under Alternative C (Preferred) 38 sites, 14 NR-eligible sites, 431 stone features, 1,325 acres placed in American Indian Education Trust as an offset to impacts.
	(See Cultural impacts)	See Cultural impacts	See Cultural impacts
<b>Environmental Justice</b>	EFFECTS DURING MINING would include:		
	(See Cultural impacts)	See Cultural impacts	
<b>Socio-economics</b>	EFFECTS DURING MINING would include:		
	Employment Potential (no additional jobs in mine are expected)	Moderate, beneficial, short term on existing mine area	Same as No-Action on expanded mine areas

**Table 2.3**  
**Summary Comparison of Magnitude and Duration of Cumulative Impacts**

Description of Potential Impacts by Resource	Magnitude and Duration of Impact	
	No-Action Alternative (B)	Proposed Action (A) and Alternative (C)
<b>Air Quality</b> IMPACTS ASSOCIATED WITH MINING OPERATIONS would include:	Moderate, short term on active mine areas Moderate, short term on active mine areas	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas
<b>Water Resources</b> IMPACTS TO SURFACE WATER could result in: Temporary reduction in soil infiltration rates and increase runoff	Moderate, short term on active mine area	Same as No-Action on expanded mine areas
IMPACTS ON GROUNDWATER could result in: Depressed water levels in aquifers adjacent to mine Change in groundwater quality in backfilled areas	Moderate, short term near active mine area Moderate, long term near active mine area	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas
<b>Soils</b> RECLAIMED SOILS could result in:	Negligible, long term on existing mine areas Negligible, long term on existing mine areas	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas
<b>Land Use/Vegetation</b> IMPACTS ON LAND USE could result in: Increased soil productivity Reduced erosion	Moderate, short term on existing mine areas Moderate, short term on existing mine areas	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas
SURFACE DISTURBANCE would result in: Loss of common native vegetation types for wildlife Regional loss of vegetative diversity	Negligible, long term on existing mine area Negligible, long term on existing mine area	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas
<b>Wildlife</b> IMPACTS ON WILDLIFE FROM SURFACE MINING could result in:	Negligible, short term on existing mine areas Minor, short term on existing mine areas Minor, long term on existing mine areas Minor, long term on existing mine areas	Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas Same as No-Action on expanded mine areas

## Description of Potential Impacts by Resource

## Magnitude and Duration of Impact

Resource Name	No-Action Alternative (B)	Proposed Action (A) and Alternative (C)
<b>Cultural</b> IMPACTS ASSOCIATED WITH MINING OPERATIONS would include: Loss of 740 sites, 2,491 features, 68,683 acres of cultural landscape. Destruction of cultural features and landscape, archeological sites eligible for National Register are mitigated for purposes of NHPA by data recovery or avoidance.	Major, long term on existing/active mine areas	Same as No action on expanded/active mine areas Under Alternative C, (Preferred), 38 sites, 14 NR-eligible sites, 431 stone features, 1,325 acres placed in American Indian Education Trust as offset to cultural/social impacts.

## Socio-economics

IMPACTS ON SOCIO-ECONOMICS could include:

- Mineral and energy related development
- Employment
- Housing market
- Economic development
- Revenues and royalties

Minor, beneficial, short term on existing mine  
 Minor, beneficial, short term on existing mine  
 Minor, short term due to existing mine  
 Minor, beneficial, short term due to existing mine  
 Minor, beneficial, short term due to existing mine



# **3.0 AFFECTED ENVIRONMENT**

## **3.1 INTRODUCTION**

This chapter describes existing conditions of the physical, biological, cultural, and socio-economic resources in the WMA. Resources addressed here were identified during the scoping process and interdisciplinary team review.

Critical elements of the human environment that could be affected by any of the alternatives include air and water quality, cultural resources, American Indian traditional values, Threatened and Endangered species, wetlands/riparian zones, invasive non-native species, prime farmlands, and environmental justice. Five critical elements (Areas of Critical Environmental Concern, wilderness, floodplains, wild and scenic rivers, and hazardous wastes) are not present and are not addressed. The WMA has been privately owned by farmers/ranchers for over 100 years and used to raise crops and livestock. It is similar to the surrounding area in west-central North Dakota. No Areas of Critical Environmental Concern have been identified nor is any of the area considered wilderness. No rivers flow through the WMA so no floodplains or wild and scenic rivers exist. No hazardous wastes are known to exist in the rural setting of the WMA. In addition to critical elements, the chapter includes discussions of potential impacts on soils, alluvial valley floors, land use/vegetation, wildlife, and socio-economics.

## **3.2 SETTING**

The WMA lies in the glaciated northern Great Plains, south of the Missouri River. It is characterized by gently rolling uplands covered in glacial deposits and marked by shallow depressions that may hold water seasonally. The landscape is characteristic of terrain where Pleistocene ice sheets deposited glacial till and boulders (also called erratics) on eroded Tertiary bedrock. A noteworthy topographic feature is Antelope Creek and its tributaries, which make up a system of erosional valleys collectively known as the Beulah Trench. These channels carried the Missouri River during ice ages. Bedrock outcrops (usually scoria) underlie the steepest slopes in the WMA. Uplands lie approximately 2,000 feet above sea level with local topographic relief around 300 feet.

The stratigraphic column of the northern Great Plains is sedimentary in origin, approximately three miles thick, and represents geologic periods from the Cambrian through early Tertiary. Deposition occurred in marine, transitional marine, and terrestrial environments. The near-surface stratigraphy includes Sentinel Butte and Coleharbor Formations. The currently mineable coal seams occur in the Sentinel Butte

Formation (Paleocene), which were deposited on swampy floodplains along meandering rivers.

The only economically recoverable coal is the Beulah-Zap seam of the Sentinel Butte Formation. The Beulah-Zap coal is 15 to 22 feet thick in the WMA.

## **3.3 MINE HISTORY AND OPERATIONS**

Coteau began mining and selling coal from the Freedom Mine in 1983; current annual production is about 15.6 million tons. Through year 2000 approximately 219 million tons of lignite coal had been hauled from the Freedom Mine. Coal production from the proposed WMA would be used to meet Coteau's contract obligations with Dakota Coal Company, which supplies Dakota Gasification Company's Synfuels Plant, Basin Electric Power Cooperative's Antelope Valley Station and Leland Olds Station, and United Power Association's Stanton Station. Electricity generated at these power plants is provided to members of the Basin Electric Cooperative.

Coal is removed from the Beulah-Zap seam by surface mining techniques. Overburden removal is accomplished with the use of a truck and shovel fleet, draglines, and tractor scrapers. Overburden is spoiled by the dragline using various techniques. Once all overburden has been removed, the coal surface is cleaned, drilled and blasted. Coal is loaded by shovel or front-end loader and hauled by trucks from the pit to coal hoppers. It is then crushed to a prescribed size and transported to the appropriate customer storage area.

After coal is removed, overburden from the next pit is spoiled into the empty pit and the operation becomes a reclamation project. Mining and reclamation of the WMA would be a continuation of normal operations that are ongoing at Coteau's Freedom Mine.

## **3.4 AIR QUALITY AND CLIMATE**

### **Air Quality Regulations**

The basic framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act and its amendments, and the 1999 Regional Haze Regulations. The Clean Air Act addresses criteria air pollutants, State and national ambient air quality standards for criteria air pollutants and the Prevention of Significant Deterioration program. The Regional Haze Regulations address visibility impairment.

Air Pollutants addressed in this EIS include (1) criteria pollutants, (2) hazardous air pollutants, and (3) sulfur and nitrogen compounds.

Criteria pollutants are those for which national standards of concentration have been established; concentrations greater than these standards represent a risk to human health. Criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), sulfur dioxide (SO<sub>2</sub>), and particulate matter (PM<sub>10</sub>), and fine particulate matter (PM<sub>2.5</sub>).

Particulate matter (i.e., soil particles, hair, pollen) is essentially the small particles suspended in the air, which settle to the ground slowly and may be re-suspended if disturbed. Separate allowable concentration levels for particulate matter are based on the relative size of the particle: PM<sub>10</sub>, particles with diameters less than 10 micrometers are small enough to be inhaled and can cause adverse health effects. PM<sub>2.5</sub> particles with diameters less than 2.5 micrometers are so small that they can be drawn deeply into the lungs and cause serious health problems. These particles are also the main cause of visibility impairment.

Hazardous Air Pollutants include N-hexane, ethylbenzene, toluene, xylene, formaldehyde and benzene. Although hazardous air pollutants do not have Federal standards, they do have "significance thresholds" set by various States and are typically evaluated for potential chronic inhalation and cancer risks. Hazardous air pollutant emissions are associated with industrial activity, including oil and gas operations, refineries, paint facilities, wood working shops and dry cleaners.

Sulfur and nitrogen compounds that can be deposited on terrestrial and aquatic ecosystems include nitric acid (HNO<sub>3</sub>), nitrate (NO<sub>3</sub><sup>-</sup>), ammonium (NH<sub>4</sub><sup>+</sup>), and sulfate (SO<sub>4</sub><sup>2-</sup>).

The primary pollutant of concern associated with surface mining operations is particulate matter measuring less than 10 micrometers in diameter (PM<sub>10</sub>).

## North Dakota and National Ambient Air Quality Standards

North Dakota Ambient Air Quality Standards (NDAAQS) and National Ambient Air Quality Standards (NAAQS) set the absolute upper limits for criteria air pollutant concentrations at all locations to which the public has access. The NDAAQS and NAAQS are legally enforceable standards. Concentrations above the NDAAQS and NAAQS represent a risk to human health. State standards must be equally or more strict than Federal standards, but cannot be less strict.

The EPA has developed standards for each criteria pollutant for a specific averaging time. Short averaging times (1, 3, and 24 hours) address short-term exposure while annual standards address long-term exposure. Annual standards are set to lower allowable concentrations than are short-term standards to recognize the cumulative effects of long-term exposure.

**Table 3.1**  
**National and North Dakota Air Quality Standards for Criteria Pollutants**

Air Pollutant	Averaging Time	NAAQS µg/m <sup>3</sup> ppm		NDAAQS µg/m <sup>3</sup> ppm	
Carbon Monoxide CO	1 hour 8 hour	40,000 10,000	35 9	40,000 10,000	35 9
Nitrogen Dioxide NO <sub>2</sub>	Annual	100	.053	100	.053
Sulfur Dioxide SO <sub>2</sub>	1 hour 3 hour 24 hour Annual	1300 365 80	.5 .14 .03	715 260 60	.273 .099 .023
Ozone O <sub>3</sub>	1 hour 8 hour	235 157	.12 .08	235 15	.12
Particulate Matter PM <sub>10</sub>	24 hour Annual	150 50		150 50	
Fine Particulate Matter PM <sub>2.5</sub>	24 hour Annual	65 15			

## Prevention of Significant Deterioration

The goal of the Prevention of Significant Deterioration (PSD) program is to ensure that air quality in areas with clean air does not significantly deteriorate, while maintaining a margin for future industrial growth. Under PSD, each area in the United States is classified by the air quality in that region:

- **PSD Class I Areas:** Areas with pristine air quality, such as wilderness areas, national parks and areas that are reclassified to Class I (e.g., Indian reservations), are accorded the strictest protection. Only very small incremental increases in concentration are allowed in order to maintain the clean air quality in these areas.
- **PSD Class II Areas:** Essentially, all areas that are not designated Class I are designated Class II. Moderate incremental increases in concentration are allowed, although the concentrations are not allowed to exceed the concentrations set by North Dakota and Federal standards (NDAAQS and NAAQS).
- **PSD Class III Areas:** No areas have yet been designated Class III. Concentrations would be allowed to increase more than the Class I and Class II areas; however, concentrations cannot exceed the NDAAQS and NAAQS.

**Table 3.2**  
**PSD Increments**

Pollutant	Averaging Time	PSD Increment			
		Class I		Class II	
Nitrogen Dioxide NO <sub>2</sub>	Annual	2.5	0.0013	25	0.013
Sulfur Dioxide SO <sub>2</sub>	3 hour	25	0.0096	512	0.1956
	24 hour	5	0.0019	91	0.0348
	Annual	2	0.0008	20	0.0076
Particulate Matter PM <sub>10</sub>	24 hour	8		30	
	Annual	4		17	

Mandatory PSD Class I areas in the vicinity of Freedom Mine include Theodore Roosevelt National Park (3 units) and the Lostwood Wilderness Area in North Dakota. Class I areas in Montana include the Medicine Lakes Wilderness Area, and Fort Peck Indian Reservation. The Freedom Mine region and remaining Indian Reservations in Montana and the Dakotas are classified as PSD Class II.

Our analysis compares potential air quality impacts from the proposed Alternatives to applicable ambient air quality standards and PSD increments. Comparisons to the PSD Class I and II increments are intended to evaluate a threshold of concern for potential impacts, and do not represent a regulatory PSD Increment Consumption Analysis. Even though most of the development activities would occur within areas designated PSD Class II, potential impacts on regional Class I areas are evaluated.

## Regional Haze Regulations

Visibility impairment is an indicator of air pollutant concentration. Visibility can be defined as the distance one can perceive color, contrast and detail. Fine particulate matter (PM<sub>2.5</sub>) is the main cause of visibility impairment. Visual range, one of several ways to express visibility, is the furthest distance a person can distinguish a dark landscape feature from a light background like the sky. Without human caused visibility impairment, natural visual range would average about 150 miles in the western United States and about 70 miles in the eastern United States.

The Regional Haze Regulations were developed by the EPA in response to the Clean Air Act Amendments of 1990. They are intended to maintain and improve visibility in PSD Class I areas across the United States, so that visibility in these areas is returned to natural conditions.

## Climate and Meteorology

The climate of the Freedom Mine area is classified as mid-latitude semi-arid steppe (Trewartha and Horn, 1980). Steppe climate is characterized by large seasonal variations in temperature (for example, cold winters and warm summers) and by precipitation levels that are low but still sufficient to support grasses.

Weather data for the Freedom Mine area are available from the State ambient monitoring station located in Beulah, North Dakota. Beulah is at an elevation of 1,785 feet and is about nine miles southeast of the proposed WMA.

### Temperature

Annual temperature normals are 43° F in Beulah, North Dakota. Summer highs are usually in the 80's and winter lows are generally in the single digits.

North Dakota temperature data are available for the past 40 years (1961 through 2000). These data show little overall warming or cooling in Beulah, North Dakota (NOAA, 1992 and 2002).

### Precipitation

Mean annual precipitation is 17 inches in Beulah. Data from the National Oceanographic and Atmospheric Administration (NOAA) show very slight drying from the period between 1961 and 1990 to the period between 1971 and 2000. (NOAA, 1992 and 2002).

### Dispersion

Atmospheric stability is a measure of the atmosphere's capacity to disperse pollutants. Although stability data are not available for the Freedom Mine project area, they are available for the Bismarck International Airport, about 70 miles to the southeast. These data indicate that annual dispersion at Bismarck is high (stability classes A, B and C) less than 15% of the time, low (stability classes E and F) about 30% of the time, and fair (stability class D) about 57% of the time (EPA, 1992).

### Wind Velocity

Windy conditions are common due to the passage of mid-latitude cyclones and associated fronts compounded by the lack of physical barriers. Prevailing winds are from the north-northwest at an average speed of 12 miles per hour. Winds from the east and southeast are also commonplace.

## Air Quality

Elements of air quality addressed in this EIS include concentrations of air pollutants and visibility. Air quality monitoring shows concentrations of air pollutants has remained steady, while coal production has more than doubled during a similar period.

### Pollutant Concentrations

Pollutant concentration refers to the mass of pollutant present in a volume of air, and can be reported in units of micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), parts per million (ppm) or parts per billion (ppb). The State of North Dakota has used monitoring and modeling to determine that the Freedom Mine region is in compliance with North Dakota and Federal concentration standards.

Table 3.3 presents background concentrations for the five criteria pollutants addressed in this analysis. These concentrations are intended to represent air quality conditions in western North Dakota. The table shows background concentration (“Monitored Concentration”) and as a percentage of applicable Federal and North Dakota air quality standards.

## Sulfur Dioxide

$\text{SO}_2$  forms during combustion from trace levels of sulfur in coal or diesel fuel, and can convert to ammonium sulfate ( $\text{SO}_4^{2-}$ ) and sulfuric acid ( $\text{H}_2\text{SO}_4$ ), which can cause visibility impairment and acid rain. Volcanoes are natural sources of  $\text{SO}_2$ .

The State of North Dakota monitored  $\text{SO}_2$  concentrations during 2002 near Dunn Center. The background  $\text{SO}_2$  concentrations are about two to five percent of applicable standards.

Other monitoring of sulfur compounds in the Freedom Mine region includes  $\text{SO}_2$  concentration monitoring by the Dakota Gasification Company,  $\text{SO}_2$  concentration monitoring in Theodore Roosevelt National Park by the State of North Dakota, and  $\text{SO}_2$  concentration and dry deposition monitoring by the Clean Air Status and Trends Network (CASTNet), and precipitation chemistry and wet deposition monitoring by the National Atmospheric Deposition Program (NADP). The State of North Dakota has monitored  $\text{SO}_2$  concentration at the Dakota Gasification Company monitoring stations #16 and #17 since 1995. These data show that  $\text{SO}_2$  concentrations have been steady and well below the  $\text{SO}_2$  NAAQS and NDAAQS from 1995 through 2002.

**Table 3.3**  
**Background Concentrations of Criteria Air Pollutants**

Pollutant	Averaging Time	Monitored Concentration	Percent NAAQS	Percent NDAAQS
Carbon Monoxide CO	8 hour	4.5 ppm	50%	50%
	1 hour	7.2 ppm	21%	21%
Nitrogen Dioxide $\text{NO}_2$	Annual	1.7 ppb	3%	3%
Sulfur Dioxide $\text{SO}_2$	Annual	1.2 ppb	4%	5%
	24 hour	3 ppb	2%	3%
	3 hour	11 ppb	2%	
	1 hour	21 ppb		8%
Ozone $\text{O}_3$	8 hour	62 ppb	52%	
	1 hour	68 ppb	85%	85%
Particulate Matter $\text{PM}_{10}$	Annual	13 $\mu\text{g}/\text{m}^3$	26%	26%
	24 hour	28 $\mu\text{g}/\text{m}^3$	19%	19%
Fine Particulate Matter $\text{PM}_{2.5}$	Annual	6 $\mu\text{g}/\text{m}^3$	40%	
	24 hour	14 $\mu\text{g}/\text{m}^3$	22%	

The State of North Dakota has also monitored SO<sub>2</sub> in Theodore Roosevelt National Park since 1980. These data show that SO<sub>2</sub> concentrations have been steady and well below the SO<sub>2</sub> NAAQS and NDAAQS from 1980 through 2002.

The U.S. EPA questioned compliance with the SO<sub>2</sub> PSD increments. The findings of two State public hearings indicated the North Dakota State Implementation Plan (SIP) is adequate to protect against air quality deterioration. Refer to the EPA (EPA, 2003) and the State of North Dakota (North Dakota Department of Health, 2003) for in-depth analysis.

## **Particulate Matter**

The State of North Dakota has monitored PM<sub>10</sub> concentrations near Beulah, North Dakota since 1995, and PM<sub>2.5</sub> concentrations since 2000. These data show that PM<sub>10</sub> concentrations have been below PM<sub>10</sub> NAAQS from 1995 through 1998, and that PM<sub>2.5</sub> concentrations have been below PM<sub>2.5</sub> NAAQS from 2000 through 2002.

## **Visibility**

The Inter-Agency Monitoring of Protected Visual Environments (IMPROVE) has measured visibility in national parks and wilderness areas in the United States since the 1980's. There is one IMPROVE station in North Dakota, located in

Theodore Roosevelt National Park. Visibility can be expressed in terms of deciviews (dV), a measure for describing perceived changes in visibility. One dV is defined as a change in visibility that is just perceptible to an average person.

Visibility data are calculated for each day, ranked from cleanest to haziest, and divided into three categories:

- 20% cleanest: mean visibility for the 20% of days with the best visibility
- average: the annual median visibility
- 20% haziest: mean visibility for the 20% of days with the poorest visibility

An IMPROVE station was installed at Theodore Roosevelt National Park in December of 1999. Preliminary analysis through May 2000 shows that average visibility is about 70 to 80 miles. This IMPROVE station has not operated long enough to determine a trend of improving or worsening visibility condition in Theodore Roosevelt National Park.

## **Summary of Existing Air Quality**

Air quality monitoring and dispersion modeling show that air quality in the Freedom Mine region is generally good. Table 3.4 indicates air quality components along with comments on present situation.

**Table 3.4**  
**Summary of Air Quality in the Freedom Mine Region**

Air Quality Component	Comment
<b>Climate</b>	
Temperature	Temperatures in Beulah show no warming or cooling trend.
Precipitation	Very slight decrease in mean annual precipitation in Beulah (.05 inches)
<b>Air Pollutant Concentrations</b>	
Criteria Air Pollutants	<ul style="list-style-type: none"> <li>• Concentrations in Beulah and Theodore Roosevelt National Park (TRNP) are in compliance with NAAQS and NDAAQS.</li> <li>• Compliance with the SO<sub>2</sub> PSD increments was questioned by the U.S. EPA; however, the findings of two State public hearings indicated the North Dakota SIP is adequate to protect against air quality deterioration. Ambient monitoring for SO<sub>2</sub> continues to show that concentrations remain low in all Class I areas.</li> </ul>
<b>Visibility</b>	
Badlands Wilderness	20% cleanest: 100 – 120 miles average: 70 – 80 miles 20% haziest: 30 – 40 miles
Theodore Roosevelt National Park	Average visibility about 70 – 80 miles

## 3.5 WATER RESOURCES

### Ground Water

Shallow groundwater occurs in unconfined aquifers—sandstone and lignite strata—of the Sentinel Butte Formation. The Beulah/Lower Beulah lignite, which is the focus of mining, is the thickest of the shallow lignites and forms a continuous bed over most of the WMA. This aquifer is the source for 17 wells in the WMA. The water is used for both domestic and livestock watering purposes. These wells can produce water in the range of one to 12 gallons per minute, with the majority flowing at three to seven gallons per minute. Water quality is highly variable.

Precipitation is the sole source of groundwater for uplands in WMA. North-central Mercer County receives about 17 inches of precipitation annually. Four fifths (14 in) of this comes as rainfall with the remaining fifth (3 in) as snowfall. In western North Dakota, annual evapotranspiration greatly exceeds total annual precipitation. The amount of precipitation infiltrating the ground is small compared to the percentage of precipitation lost to runoff, transpiration and evaporation. The rate of ground water recharge is trivial because of low annual precipitation and the low hydraulic conductivity of surficial materials. Under natural conditions, the groundwater flow regime occurring within a layered sequence of till, silt, clay, and lignite is very slow and produces small vertical recharge rates. However, given a large enough area and enough time, precipitation can provide substantial amounts of water to local aquifers.

### Surface Water

The WMA is divided into watersheds of West Antelope Creek, Knife River, and Lake Sakakawea, all of which lie within the Missouri River drainage basin. The area does not contain any perennial streams, or natural lakes. Surface runoff drains eastward through Antelope Creek into the Knife River, northward along several tributaries into Lake Sakakawea at Beaver Creek Bay, and southward into Spring Creek and Knife River. Local ephemeral and intermittent streams have peak flows as a result of snowmelt or summer thunderstorms. Annual runoff averages about one inch. Surface water is typically a sodium-sulfate type.

Forty-three premining stock ponds are located within the WMA and are used for livestock watering. Stock pond configurations consist of dugouts, and/or embankments, and are fed by surface water runoff or a combination of surface water and springs. The number of stock ponds within the permit area is consistent with native grassland being the primary land use. No alluvial valley floors or floodplains are present.

## 3.6 SOILS

A wide range of soils exists in the WMA. A registered Professional Soil Classifier of North Dakota conducted a detailed soil survey of the proposed permit area. Soil mapping units are delineated and identified along with the depth of topsoil and subsoil of each unit that is suitable for saving and replacing during reclamation.

Soil series such as Amor, Cabba, Zahl, or complexes of these soils, commonly occupy steeper areas (25%+ slopes). The Amor and Cabba series are moderately deep and shallow soils, respectively, derived from underlying soft shale and sandstone bedrock. Zahl series is a shallow soil developed in a thin mantle of glacial till that overlies soft bedrock. These loamy soils possess low natural fertility and are used primarily as grazing lands.

Soil series such as Arnegard, Bowbells, Grail, Parshall, Shambo, Straw, Williams, or complexes of these soils, are found over much of the landscape of the WMA where gentle to moderate slopes exist. These soils have formed in wind or water deposited alluvial sediments and in glacial till. They possess high natural fertility and are used extensively for cropland. Steeper portions of these soils are commonly used for hay and pastureland.

Natural Resource Conservation Service (NRCS) designated prime farmlands are present on approximately 1,022 acres throughout the proposed WMA. Of this total, there are approximately 143 acres of prime farmland overlying Federal coal tracts.

## 3.7 LAND USE/VEGETATION

The WMA lies in the Missouri Slope Vegetative Zone and ranges from flat ground to gently rolling hills, steeper hills dissected by valleys (trenches), wetlands, and shallow drainages. The primary land uses on Federal coal tracts are cropland and native grassland as shown in Table 3.5.

**Table 3.5**  
**West Mine Area Land-Use Tabulations (Acres)**

Land Use	Federal Coal Tracts	Entire Permit Area
Cropland	1,118.0 (20%)	5,325.6 (31%)
Native Grassland	3,982.2 (72%)	10,660.0 (63%)
Tame Pasture	176.9 (3%)	332.3 (2%)
Shelterbelt	11.6 (<1%)	41.2 (<1%)
Wetlands	67.0 (1%)	227.4 (1%)
Stockponds	3.5 (<1%)	12.6 (<1%)
Woodlands	172.7 (3%)	356.6 (2%)
Industrial	12.3 (<1%)	89.3 (<1%)
	5,544.2 acres	17,051.0 acres

Land uses and vegetation characteristics of Federal coal tracts are similar to surrounding lands where cropland is intermixed with native prairie. Land uses and vegetation patterns reflect local and regional economic conditions along with climatic, geologic, and edaphic factors.

Vegetation surveys of native grasslands indicate that the range is in generally good condition. Common species include western wheatgrass, blue gramma, green needlegrass, junegrass, sedges, and forbes. No special-status plant species have been found in the study area. Although not specifically inventoried, invasive, non-native noxious weeds such as Canada thistle and leafy spurge are likely scattered throughout the WMA.

Wetlands cover nearly 230 acres of the WMA. They are found primarily along deep, dissected drainages. A majority of pothole-type wetlands are located off the Federal coal tracts in sections 15 and 21, T. 145 N., R. 88 W. Sixty-seven acres of Class 3 wetlands have been identified on the Federal coal tracts of the WMA. These features were identified on color infrared photography acquired and interpreted by the U.S. Fish & Wildlife Service for a National Wetlands Inventory carried out between 1979 and 1984.

Five wetland seeps were located during a detailed soil survey conducted over the WMA. Three of the seeps are found in the southwestern part of the WMA and two in the north. The seeps range from one-tenth acre to about two acres in size (5.25 total acres). One seep has characteristics of a fen. Fens are peat-forming (organic soil) wetlands that receive nutrients from sources other than precipitation, usually from upslope sources through drainage from surrounding mineral soils and from groundwater movement. Fen soils typically must have a surface organic horizon greater than 16 inches in thickness. They differ from bogs in that fens are less acidic and have higher nutrient levels. The seep in section 6, T. 144 N., R. 88 W., which is about one-half acre in size, demonstrates the fen characteristics described above. The other four wetland seeps would be considered fen-like but not true fens.

## 3.8 WILDLIFE

Wildlife surveys have been conducted in the WMA. Common species of larger mammals include coyote, red fox, mule deer, whitetailed deer, pronghorn antelope, rabbit, raccoon, badger, porcupine, and skunk. Smaller mammals include the fox squirrel, weasel, ground squirrel, pocket gopher, and various species of mice and voles. No prairie dogs (a T&E candidate species) are known to exist in the WMA.

Amphibians and reptiles that might be found in the WMA include blotched tiger salamander, great plains toad, northern leopard frog, western painted turtle, plains garter snake and bull snake.

Avian surveys indicate this area is not used for nesting by eagles, and only minimally by other raptors. Red-tailed hawks and northern harriers are common migrant raptors found throughout the area. Bald and golden eagles have been seen flying around the Freedom Mine. Sharp-tailed grouse, wild turkey, gray partridge, and pheasants have been noted, but this area is outside the range of sage grouse. The Migratory Bird Treaty Act puts special emphasis on those birds that use an area seasonally. Common migrants to west-central North Dakota, which were recently observed in the WMA, include mallard, blue-winged teal, mourning dove, willow flycatcher, eastern and western kingbird, robin, cedar waxwing, common yellowthroat, song sparrow, red-wing blackbird, brewer's blackbird, cowbird, and goldfinch. Some songbirds such as house sparrows, magpies, blue jays, and chickadees may be seen in the area year-round.

Detailed lists of wildlife observed on and in the vicinity of the WMA along with a discussion of wildlife can be found in Coteau's PAP submitted to the PSC.

BLM consulted with the U.S. Fish and Wildlife Service (FWS) regarding threatened and endangered (T&E) species. FWS responded by memo, dated 3/29/2002, that they were not aware of any T&E species listed for Mercer County frequenting the WMA. They concluded that FWS does not object to leasing the Federal coal tracts, consistent with BLM's 1988 Resource Management Plan. On 7/30/03 the BLM requested an update from FWS on T&E consultation, as over a year had passed since the initial correspondence. The BLM North Dakota Field Office received a reply from FWS on 8/22/2003 confirming their earlier conclusion. There were no FWS candidate (Dakota skipper butterfly) or sensitive (western burrowing owl, Baird's sparrow) species observed during wildlife surveys conducted within the past three and one-half years in the WMA.

Key wildlife habitats consisting of wooded draws, wooded shrublands, and riparian habitats greater than approximately 40 acres in extent were placed in a category called Wildlife Threshold Acres in the coal planning section of the North Dakota Resource Management Plan. The Antelope Coal Study Area (CSA), of which the WMA is a part, had 2,164 threshold acres identified within it. The Resource Management Plan stated that up to half (1,082) of the threshold acres would be allowed to be leased without restrictions. There are approximately 780 wildlife threshold acres in the WMA. No other wildlife threshold acres have previously been leased in the Antelope CSA. Therefore, all wildlife threshold acres in the WMA would be available for leasing.

## 3.9 CULTURAL RESOURCES

A survey of the WMA was conducted in 1999 (Boughton et al. 1999). Two hundred fifty-one sites were recorded within

the WMA, including 201 prehistoric and 50 historic period sites. The prehistoric sites consist of stone rings, cairns and alignment features, a few lithic scatters, and single petroglyph, burial, and effigy sites as explained in Appendix D (Archeological Features) and tabulated in Table 3.6.

Following the 1999 Survey, in 2000 a Testing and Evaluation Plan was developed for National Register of Historic Places (NRHP) evaluation of the prehistoric sites. The sites were tested that same year (Peterson et al. 2000; Boughton et al. 2001). This plan defined data gaps, developed a research design and defined the registration requirements to recommend prehistoric sites eligible for the NRHP under Criterion D. Criterion D is the ability of a site to yield, or potentially yield, information important to prehistory or history. After the sites were tested in 2000, NRHP eligibility recommendations were made for prehistoric sites based on the Testing and Evaluation Plan criteria (Boughton et al. 2001). In addition to those recommendations that had been based on the plan criteria, sites with important individual features were also recommended as eligible. A total of thirty-nine prehistoric sites were determined eligible under criterion D (Figure 3.1).

Historic period sites were also recorded during the archeological surveys (Boughton et al. 1999). These historical sites included farmsteads, depression/foundations, windmills, quarry sites, a bridge, a pump, a mine and a couple of historic period cultural material scatters. After reviewing historical sources, only the Ricker farmstead, 32ME189, was recommended eligible to the NRHP under Criterion C because it reflected traditional German-Russian methods of construction.

In addition to the prehistoric sites having archeological significance and the historic period site with significant architecture, a Traditional Cultural Property (turtle effigy) was also identified. The 41 National Register eligible sites and other sites within the WMA area include: 1,721 stone fea-

tures (rings, cairns, alignments, effigy, lined depressions), one known burial site, and the possibility of other unmarked burial sites. All these features have continuing importance to prehistorians and American Indian communities with historic ties to the area.

The context for the archeological resources is the North Dakota State Plan for archeological sites, which was developed as a general historic context for archaeological sites in the state. The plan summarizes existing information, identifies gaps in the data and provides research topics. The primary purpose was to “facilitate the identification of ‘Historic Properties,’ i.e., cultural sites or properties eligible for listing on the National Register of Historic Places” (State Historic Society of North Dakota-Archaeology and Historic Preservation [SHSND-AHP] 1990:A.1). The portion of the State Plan pertinent to the WMA is the Knife River Study Unit.

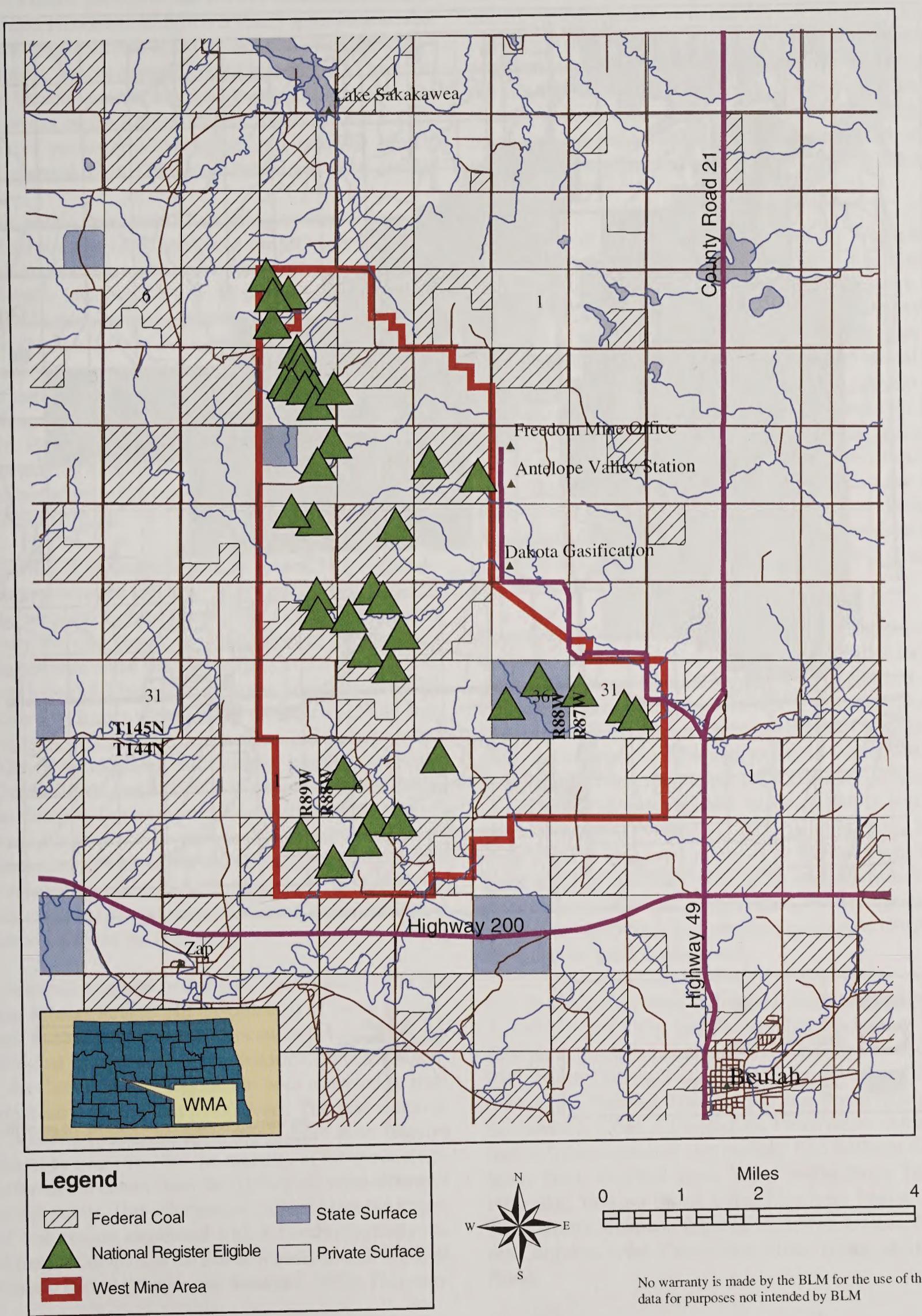
Since 1979, approximately 69,000 acres have been investigated for cultural resources in what is identified as the Coteau Mining Region (Figure 3.2). This region includes the WMA, areas previously mined, and areas currently surveyed for future mining operations. Four hundred forty prehistoric sites have been identified and data recovery has been performed at 19 sites previously impacted by mining. Perhaps more is known about the archaeological features associated with the Coteau Mining Region than elsewhere in North Dakota. The region is part of the glaciated subsection of the Missouri Plateau and is distinguished by rolling uplands covered in glacial till. A number of Pleistocene-age glacial advances deposited successive till layers along with glacial erratics across an erosional relief dominated by Tertiary bedrock (Wyckoff and Kuehn 1983:160).

The most noticeable natural feature in the Coteau Mining Region is the Beulah Trench. The Beulah Trench lies roughly 100 feet below the surrounding uplands. The trench runs in a southeast to northwest direction; its northern terminus

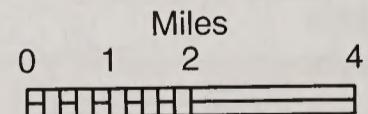
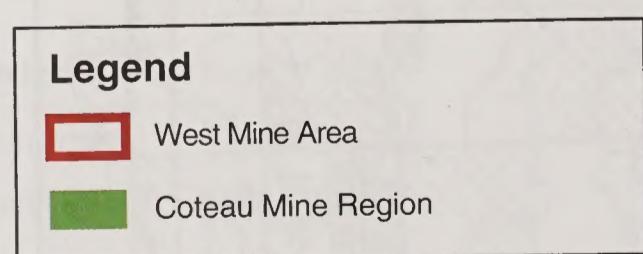
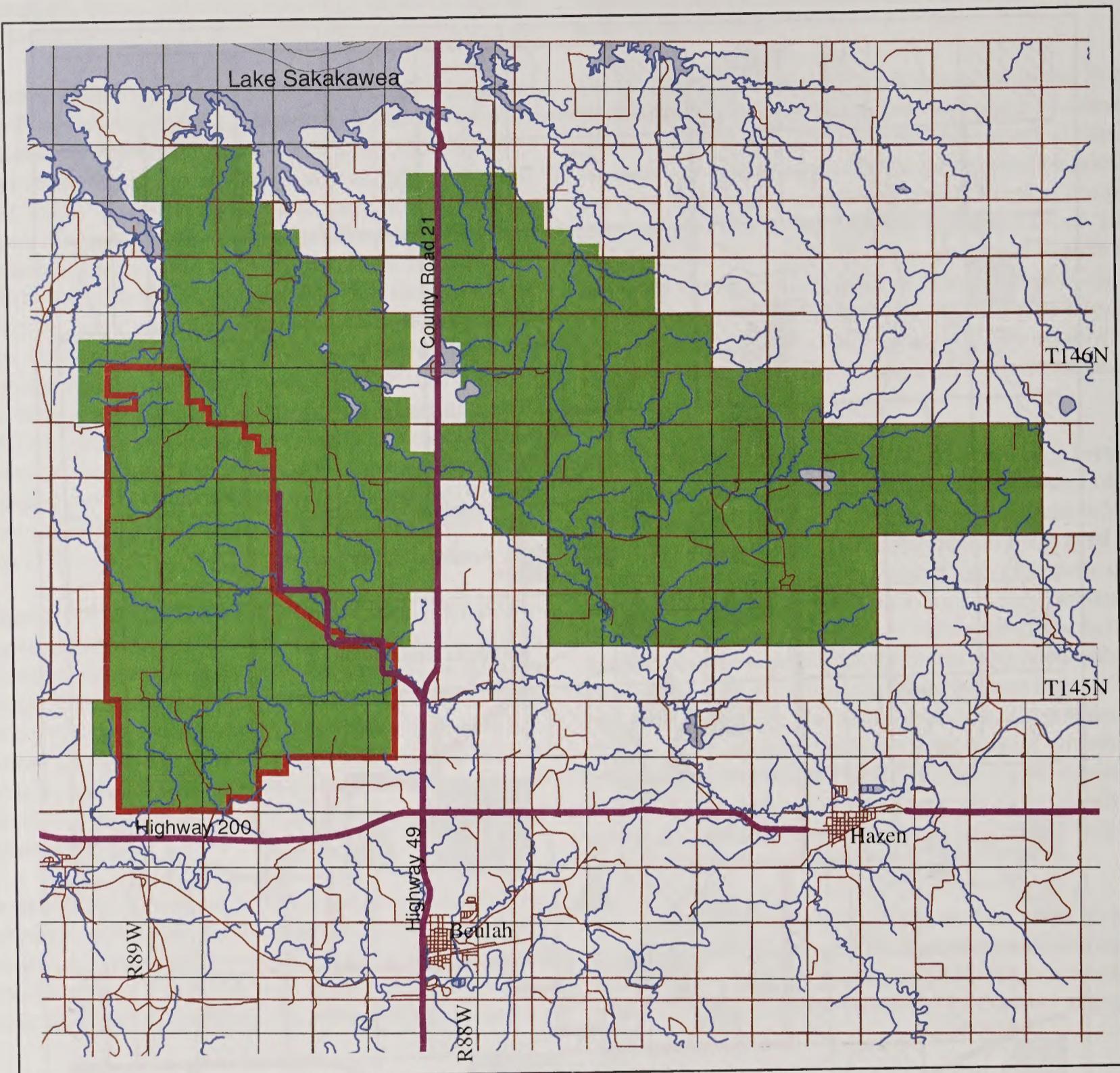
**Table 3.6**  
**Prehistoric Archeological Features within the West Mine Area**

Prehistoric Features in WMA	Federal Coal	State Coal	PVT Coal	WMA Total
Stone rings	444	86	755	1285
Stone Cairns	167	86	152	405
Stone Alignments	13	1	7	21
Stone Lined Depressions	2	1	6	9
Effigy	1	0	0	1
Recorded Burial/Earthen Burial Mound	1	0	0	1
Others (Cultural Material Scatter)	4	0	6	10
<b>TOTALS</b>	<b>632</b>	<b>174</b>	<b>926</b>	<b>1,732</b>

**Figure 3.1**  
**West Mine Area Showing Site Distributions and National Register Eligible Sites**



**Figure 3.2**  
**Coteau Mining Region Showing Location of the West Mine Area**



No warranty is made by the BLM for the use of the data for purposes not intended by BLM

marked by Beaver Creek. Approximately four miles north of Beulah, the trench splits into the Hazen Branch to the east and the Zap Branch to the west. The Hazen Branch borders a major portion of the WMA's southern boundary. The Beulah Trench and Knife River valley apparently served as an ice marginal route of the Missouri. As the ice continued to melt, a more easterly course was followed, and the Beulah Trench segment was abandoned (Carlson 1973:49-51). Surveys of the Coteau Mining Region reveal a high density of prehistoric habitation sites near the trench (Boughton et al. 1994; Deaver and Schweigert 1988:41-42).

Overall, within the Coteau Mining Region there is an average of 6.3 sites per 1,000 acres (one site for every 159 acres surveyed). The area to the east of the Beulah Trench has a significantly lower site density (4.6 sites/1,000 acres surveyed) than the area investigated to the west of the Beulah Trench (11 sites/1,000 acres surveyed). The reason for this difference is presently unclear. It was originally believed the difference resulted from a recording bias due to a higher percentage of plowed fields in the area east of the Beulah Trench. However, if this were the case, one might expect that the density of lithic scatters and other cultural material would be higher to the east of the trench than to the west. This is not the case.

An alternative explanation may be related to topographic differences between the areas investigated to the east versus the west sides of the trench. The average topographic diversity for sites (based on the number of contour lines within one mile of the site) located east of the trench is 9.25 contour lines (92.5 feet). The average topographic diversity associated with sites to the west of the trench is 15.24 contour lines, or 152.3 feet. Previous investigations have noted a tendency for increased utilization of bluff/terrace edges (K. Deaver 1980a and b, 1983a; Deaver and Morter 1981). These locations represent ecotonal situations where the resources of both lowlands (riparian floral and faunal communities) and uplands (floral and faunal communities of the river breaks) are accessible. The increased topographic diversity may mark the presence of ecotonal environments as preferred localities for occupation.

The cultural components that have been identified in the Coteau Mining Region and the potential of future investigations to contribute to our understanding of past lifeways are detailed in Appendix C (Prehistoric Context). In general, the Coteau Mining Region has been occupied, at least intermittently, for the past 6,000 years. The best temporal data is derived from 20 radiocarbon dates from features within stone ring sites, but the majority of the chronological information comes from the typological cross-dating of projectile points. This information indicates that the majority of features are associated with the archeologically defined Besant Complex of the Plains Woodland tradition/Late Prehistoric Period (Deaver and Brownell 1992). This com-

plex may have begun as early as 3,000 years ago and continued until 800 years ago.

At the same time the surveys and testing were being conducted, regional American Indian cultural resource specialists were invited to examine the sites and provide information pertinent to eligibility as Traditional Cultural Properties (Deaver 2001). The Assiniboine, Chippewa, Mandan, Hidatsa, Arikara, Cheyenne, and Yanktonai have claims to be original inhabitants of modern day North Dakota while the Cree, Dakota, and Lakota have spent time in the State (Schneider 1994).

The imprint of past peoples is found on the WMA landscape mainly in the form of stone features: rings, cairns, alignments, an effigy and a petroglyph. These stone features, which dot the landscape, mark locations used by the ancestors of the Mandan, Arikara, Hidatsa, and, later the Yanktonai Sioux and other nomadic groups who moved into the area in the 1700s. The Mandan, Arikara, Hidatsa and the Three Affiliated Tribes, are current residents of the Fort Berthold Reservation, and the descendants of the Yanktonai largely reside on the Standing Rock and Fort Peck Reservations. Today, the Assiniboine live primarily on the Fort Belknap and Fort Peck Reservations in Montana, while the descendants of the other Siouan groups who moved through the project area are found on various reservations throughout the Dakotas.

In June of 2000 Ethnoscience, Inc. was contracted by Coteau to conduct investigations and provide recommendations regarding Traditional Cultural Values for the WMA and adjacent mine extension areas. That report was completed in September of 2001 (Deaver 2001). Portions of that text are presented in Appendix E (American Indian Traditional Cultural Values). Tribal representatives had conversations concerning the WMA with Federal Agencies, SHPO, and PSC earlier that year. On April 11, 2000 Standing Rock Sioux Tribe's THPO facilitated a meeting in Bismarck which began a series of meetings/consultation meetings, site visits, individual consultations, conversations, and correspondence concerning the WMA that continue today (see Chapter 5 Consultation and Coordination).

Fort Berthold's Three Affiliated Tribes, Fort Peck's Assiniboine and Sioux, and the Standing Rock Sioux Tribe have participated in consultation, as have the BLM, OSM, PSC, North Dakota State Historic Preservation Officer, Coteau, the National Trust for Historic Preservation, and the Advisory Council On Historic Preservation. American Indian Tribes consulted also include: Fort Belknap, Oglala Sioux Tribe, Rosebud Sioux Tribe, Santee Sioux Tribe of Nebraska, Yankton Sioux Tribe, Flandreau Santee Sioux Tribe, Turtle Mountain Band of Chippewa Indians, Northern Cheyenne Tribe, Crow Creek Sioux Tribes, and Lower Brule.

Most interviewed tribal specialists embrace a worldview that emphasizes the interrelationships between the past and present, the living and dead, people and the environment, and the spiritual and physical aspects of life. Time, from this perspective, is not only a chronological ordering of events but also has a quality and texture, which continues into the present and future. Time, or more accurately tradition, establishes the rationale and basis for living in the proper fashion. From this perspective, there is often an intimate relationship between a person and his past. Time, or the past, provides a template for the proper way of life. It legitimizes the present by showing it is related to things that have gone before.

The location of a cultural place/site is interpreted as evidence that ancestors recognized the physical and spiritual characteristics of the landscape, which made it an appropriate place to camp, fish, hunt, gather, fast, and so on. Because Indian people today can still recognize these same physical and spiritual characteristics of the landscape, there is a continuing tie between the people and the landscape and the people who created the site and those who view it today. It is this sense of relationship that is important.

Because perpetuation of the cultural relationship is highly valued, cultural places/sites must be shown respect, and visiting them, praying and making offerings may periodically renew the tie to these places on the landscape. In other words, these cultural places become the focus of pilgrimages. The spiritual and physical attributes of a place, as well as its traditional cultural use, are important qualities of cultural places that transcend time.

All of the tribal consultants have repeatedly stated that all of the sites within the project area are culturally important, have traditional cultural associations, or are sacred.

## 3.10 ENVIRONMENTAL JUSTICE

Environmental justice (Executive Order 12898) refers to the fair treatment and meaningful involvement of people of all races, cultures and incomes with respect to the development, implementation and enforcement of environmental laws, regulations, programs and policies. Its focus is to avoid disproportionately high and adverse human health or environmental effects on minority and/or low-income populations. Black/African American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, Aleut and other non-white persons are defined as minority populations by the Interagency Working Group convened under the auspices of the Executive Order. Low-income populations are defined as persons living below the poverty level based on total income of \$13,359 for a family household of four based on the 2000 census.

None of the defined minority populations represented more than 3% of the population in Mercer County based on 2000 census figures. However, there are four Indian Reservations with their administrative centers located in North Dakota, one located in North Dakota but predominantly in South Dakota, and one with an interest in the study area located in eastern Montana. The 2000 American Indian populations of these reservations were: Fort Berthold, 3,986; Spirit Lake (also known as Fort Totten), 3,317; Standing Rock, 5,964; Turtle Mountain, 8,009; Lake Traverse also known as Sisseton), 3,453; and Fort Peck, 6,391. All of these reservations but one had 1999 family poverty levels in excess of 30%. These figures are compared to state family poverty levels of 8.3 for North Dakota, 10.5 for Montana, and 9.3 for South Dakota.

The Fort Berthold Reservation, home to the Three Affiliated Tribes, is located adjacent to the WMA, with a small portion in Mercer County. Fort Berthold is located in west central North Dakota and covers approximately 12,284 square miles in 6 counties: McLean, Mercer, Dunn, Mountrail, McKenzie, and Ward. The Missouri River traverses the middle of the reservation and divides the reservation into three separate areas. The total land area of the reservation is 988,000 acres with 457,837 acres in tribal and individual Indian ownership. The major economic occupation on the Fort Berthold Reservation is cattle ranching and farming. Currently the Three Affiliated Tribes, Fort Berthold Community College, Bureau of Indian Affairs, the Indian Health Service and Four Bears Casino and Lodge provide the majority of employment. The 1999 family poverty level rate was 31% compared to a figure of 8.3 for the state of North Dakota as a whole.

Mercer County had a 1999 family poverty level of 5.5, compared to the state level of 8.3. The average per capita income was \$18,256 for Mercer County, compared to \$17,769 for the state as a whole.

## 3.11 SOCIO-ECONOMICS

### Social

The population of Mercer County was 8,664 in 2000. This represented a decline of nearly 12% since 1990 due to migration from the area. The county population is projected to continue to slowly decline until 2020. The Freedom mine began operating in 1983. The communities closest to the mine are Beulah and Hazen. Beulah had a 2000 population of 3,152 and Hazen had a 2000 population of 2,457. The scoping comments from Mercer County, Beulah and Hazen were positive toward the effects the mine has had on the area.

The 2000 American Indian population of Fort Berthold Reservation, which is located adjacent to the WMA, was 3,986. Consultation has been ongoing with representatives of the Three Affiliated Tribes, whose home is the Fort Berthold Reservation. Indian cultural representatives and elders have expressed concerns about the cumulative effects of mining operations on their communities (Deaver, 2001).

## Economics

The lignite industry, including the four operating mines, the electricity generating facilities and the gasification/synfuels plant, are located in the "Lignite Triangle" running from Underwood, Beulah and Center, in McLean, Mercer, and Oliver Counties. Lignite production has averaged about 30 million tons in the past 10 years. The Freedom Mine produces 15 million tons on average, half of the total.

Lignite mining is a basic industry, supporting and creating jobs in other sectors of the local and regional economy. The wages paid in the mining sector are the highest in the State. The annual salaries reported to the Job Service of North Dakota were \$62,978 in 2000 compared to a statewide average of \$24,683. As a result, the mining industry contributes substantially to local and State tax revenues (including personal and corporate income taxes), sales and use taxes, and the coal severance tax.

Federal coal production from the four mines in the area also contributes to State revenues through the portion of Federal coal royalties disbursed to the State annually. Federal coal production from the mines ranged between 2.2 and 3.3 million tons over the past 5 years, while Federal coal royalties averaged slightly more than one million dollars per year. The mine data are combined to avoid disclosure of lease data.



# **4.0 ENVIRONMENTAL CONSEQUENCES**

## **4.1 INTRODUCTION**

The surface estate of the WMA is almost entirely privately owned. Coteau holds coal leases for the non-Federal coal and is expected to recover all non-Federal coal reserves. Adding Federal reserves to the WMA mix would not constitute a substantial alteration to the overall mine plan because unleased Federal coal accounts for a modest fraction of total reserves.

## **4.2 ANALYSIS ASSUMPTIONS**

The surface mining operation would be a major undertaking with activity occurring far and wide. Equipment used would include a dragline, overburden trucks and shovels, bulldozers and bottom-dump coal haulers, front-end coal loaders and a variety of trucks (water, dump, supply, fuel, welding, field maintenance). One might expect to see coal drills, cable movers, sheepfoot compactors, road graders, mobile cranes, portable air compressors, water pumps, and scrapers on the mine site at any given time.

Coteau employs some 400 persons working two ten-hour shifts for 5-to-7 days per week, depending on conditions and the season of year. It is estimated that as much as a quarter section (160 acres) of coal lands could be disturbed by direct impacts (overburden removal and coal extraction) during an average year in the WMA. Because reclamation is concurrent with mining, an additional 200 acres would be unavailable for crops or grazing at any given time.

## **4.3 AIR QUALITY**

Coal mining and processing at the Freedom Mine are a source of particulate and gaseous air pollutants. Fugitive dust is generated by mining, hauling, processing, and storing coal and is mitigated by dust suppression practices. Gaseous pollutant emissions are generated by engine exhaust from mining equipment and by blasting.

Regulation of industrial air quality falls under the auspices of the North Dakota Department of Health, Environmental Health Section. Compliance with the terms and conditions of an air quality permit ensures fulfillment of applicable State and National Ambient Air Quality Standards (NAAQS).

### **Alternative A (Proposed Action)**

Coteau operates the Freedom Mine under authority granted by North Dakota Air Pollution Control Minor Source Permit to Operate # 085004. The WMA was included in the original permit application and is covered by Coteau's existing permit.

Through the air-quality permit, North Dakota Department of Health set standards that ensure the project meets requirements of State and Federal air-quality regulations. Under Alternative A, development of the WMA would maintain coal production as allowed under Coteau's air quality permit. Maximum annual coal production is limited to 15–16 million tons per year.

### **Alternative B (No Action)**

Impacts to air resources would be similar to those described above. Freedom mine would be expanded to include State and Private Coal; Federal reserves would be bypassed during mining. A maximum of 15–16 million tons of coal would be processed at the mine each year.

### **Alternative C (Preferred)**

Impacts under this alternative would be identical to Alternative A. Federal, State, and private coal reserves would be mined and processed. Control of particulate emissions, as required by Coteau's air-quality permit, represents standard industry practice for minimizing particulate emissions.

In summary, mining operations would comply with State ambient air-quality and Class II annual standards under any of the alternatives. No residual or cumulative impacts to air quality or climate (from particulate or gaseous emissions) would occur from a continuation of the present level of operations at the Freedom Mine.

### **Sulfur Dioxide Exceedences**

The U.S. Environmental Protection Agency (EPA) submitted comments on sulfur dioxide emissions from coal-fired power plants using lignite coal from the Freedom Mine as follows:

[S]ulfur dioxide air emissions in the area of this mine have exceeded the level of significant deterioration (PSD increment) in several areas valued for high-quality, clean air such as National Parks. \*\*\* For this project \*\*\* areas affected by sulfur dioxide emissions include the Theodore Roosevelt National Park (3 units), the Lostwood Wilderness Area, the Medicine Lakes Wilderness Area in Montana and the Fort Peck Indian Reservation.

Sulfur dioxide results from burning coal, an activity indirectly associated with leasing and mining of Federal coal. The BLM does not permit nor monitor burning of coal for purposes of generating electricity. Freedom Mine's end use facilities are all operational and licensed by the proper authority.

The North Dakota Department of Health, which is charged with responsibility for air-quality monitoring in North Dakota, is negotiating with the EPA concerning sulfur dioxide exceedences in areas of unspoiled air quality. Resolving differences in the measurement and enforcement of air quality standards between State and Federal regulators is beyond the scope of this EIS.

## 4.4 WATER RESOURCES

### Groundwater

Surface coal mining impacts groundwater quantity in two ways: (1) aquifers are removed and replaced with unconsolidated backfill and (2) groundwater levels in aquifers adjacent to the mines are lowered as a result of seepage and dewatering into the open pit. If Federal tracts are leased, the area of coal removal and reclamation at Freedom Mine would increase slightly and impacts to groundwater would increase. The area subject to lower water levels would grow roughly in proportion to the area being mined.

Mining of each Federal tract would replace shallow aquifers with backfill composed of an unlabeled mixture of the clay, silt, and sand that makes up the Sentinel Butte Formation. Impacts to the local groundwater system would include dewatering the coal and overburden within the area of coal removal and enlarging the area of drawdown caused by coal and overburden removal. The extent that a drawdown propagates away from a mine pit is a function of the water-bearing properties of the aquifer. Low permeability of lignite aquifers suggests that measurable declines in groundwater levels would not extend more than one to two miles from an active mine site (Crawley and Emerson 1981).

Disturbances from mining may result in altered chemical quality of shallow groundwater aquifers. Increases in sodium, sulfates, and total dissolved solid concentrations have been reported by Groenwald (1980) and Groenwald and Rehm (1979) at other mines in North Dakota with similar overburden. Degradation of water quality at the mine site is likely. Water quality in replaced overburden would be similarly degraded.

Surface mining would not adversely impact water levels and water quality in deep aquifers. Replacement water from deeper aquifers would be available if shallow wells were adversely affected.

Up to one dozen private water wells could be impacted (either directly by removal of the well or indirectly by water-level drawdown) by mining operations occurring within the WMA. In compliance with state law, mine operators are required to provide the owner of a water right (one whose water source is interrupted, discontinued or diminished by mining) with water of equivalent quantity and quality; this mitigation measure would be included under any mining approval. The most probable source of replacement water would be from an aquifer beneath the Beulah-Zap coal seam. Subcoal aquifers are not removed or disturbed by coal mining and so are not impacted by surface mining activity.

### Surface Water

Alteration of existing drainage patterns would occur during mining and reclamation. Because of erosion and sediment control measures (including sediment-control ponds) used during and after reclamation, increase in sediment load to Spring Creek, Antelope Creek, and Lake Sakakawea are expected to be minimal. Erosion could occur during periods of measurable rainfall and snowmelt runoff. Once vegetation growth and density on reclaimed areas becomes sufficiently reestablished, many of the erosion and sediment controls would no longer be necessary. Sediment control is subject to limitations of a National Pollution Discharge Elimination System Permit.

### Alternative A (Proposed Action)

Direct and indirect impacts to water resources would occur as a result of coal mining and related activities. Excavation of an open pit would temporarily disrupt local surface water drainage systems. Impacts to ground water would also occur because mining would remove portions of several sedimentary layers in the WMA.

### Alternative B (No Action)

Because mining of non-Federal coal would disturb much of the WMA, the impacts under this alternative are similar to those of Alternative A.

### Alternative C (Preferred)

Impacts to water resources under Alternative C would be as described for the Alternative A.

The postmining backfill may take in excess of 100 years to reach equilibrium water levels and water quality. Less time would be required near the mining boundaries. Water level and water quality in the backfill would possibly be suitable to provide water to wells for livestock use, but would be different from premining conditions.

Replaced wetlands may not duplicate the exact function and landscape features of all premining wetlands. However, all wetland replacement plans would require approval by the PSC.

## 4.5 SOILS

### Alternative A (Proposed Action)

A short-term loss of soil productivity would occur during mining; productivity would be restored with proper reclamation and management. Topsoil and subsoil removed during early stages of mining would provide an adequate layer of productive material to be replaced and averaged on reshaped overburden during reclamation. PSC's "Rules Governing Reclamation of Surface-Mined Land" requires all soils within mine permit areas to be intensively surveyed, with depths of topsoil and subsoil layers to be saved, identified and marked prior to lifting. Soil material would either be stockpiled for later redistribution or direct hauled to reshaped overburden that is ready for soil replacement.

Soil instability and erosional problems associated with reclamation would be kept to a minimum with proper handling techniques and adherence to regulatory guidelines as promulgated in Rules Governing Reclamation of Surface-Mined Land (Public Service Commission, 2001). All runoff from disturbed areas would be required to pass through sedimentation ponds on the mine permit areas, thus trapping water eroded soil materials before they move offsite. Vegetative cover would be restored on re-spread soils as quickly as possible to stabilize sites and reduce erosion. Reclaimed lands would remain under bond with the PSC until such time that successful reclamation is demonstrated under their standards.

Disturbance of any identified prime farmland would require operations in accordance with performance standards stipulated in Rules Governing Reclamation of Surface-Mined Land.

### Alternative B (No Action)

Impacts to soils would be the same as those described for Alternative A, but the 5,571 acres of Federal coal would not be leased under this alternative. Even though the Federal coal would not be leased, much of the private surface above it could be disturbed by pit-wall layback, haul roads, soil stockpiles, sedimentation ponds and the like. About 5,000 of the 5,571 acres over Federal coal could potentially receive surface disturbing activities under this alternative.

### Alternative C (Preferred)

Impacts to soils would be as described under Alternative A. The soils as they once existed would disappear with removal

prior to mining. The new soil returned during reclamation would be a mixture of the soil originally removed and would develop its own characteristics. Productivity of this new soil would return with good management during reclamation.

## 4.6 LAND USE/VEGETATION

### Alternative A (Proposed Action)

Mining would modify topography of the area. Changes in the surface configuration are expected after reclamation as the landscape is restored to its approximate original contour. Steeper slopes may be reclaimed at lower gradients to improve water infiltration and lessen the impacts of erosion.

More land may eventually be converted to cropland after reclamation depending upon surface-owner preferences. Vegetation would be removed in areas being mined, but would be reestablished during reclamation. Some invasive, non-native noxious weeds would be expected to take root during reclamation. The lessee would be required to control such weeds as part of a reclamation program, which would be overseen by the PSC.

### Alternative B (No Action)

Impacts would be the same as under the proposed action except slightly less surface land and vegetation would be disturbed (see discussion for Alternative B under Part 4.5 Soils).

### Alternative C (Preferred)

Impacts would be the same as under the alternative A. Residual impacts to land use are expected to be minimal because crop, rangelands, wetlands and other wildlife habitats would be replaced. Reclaimed prairie communities may never completely match the surrounding native plant community.

Wetlands, including fen-like wetlands, would be removed during mining. Appropriate water permits (i.e., Corps of Engineers Water Permit) would be required as part of the mine permit process. All wetland replacement plans submitted by the mining company would require approval by the PSC.

## 4.7 WILDLIFE

### Alternative A (Proposed Action)

Wildlife habitat in the WMA has already been greatly reduced by modification of the land from native prairie to

agricultural uses. Remaining areas of native prairie have been converted to grazing lands for livestock or are harvested for hay. These habitats would be disturbed incrementally as mining progresses across the landscape. Wildlife, including migratory birds, would be disturbed or displaced where active mining would be occurring, but in turn would find new habitat in reclaimed lands or adjacent/nearby undisturbed areas. Restrictions to wildlife movement created by fences, spoil piles, and pits would also occur. Some wildlife mortality would be expected due to mining. Rodents, skunks, snakes and frogs would be most vulnerable to injury or death by surface operations.

Wetland, native prairie, wood/shrub habitat would be removed by mining. These habitats would be replaced as part of the reclamation process.

### **Alternative B (No Action)**

Impacts to wildlife would be very much the same as under Alternative A. Federal coal would not be mined under this alternative, but the recovery of state and private coal and disturbances to private surface over Federal coal would result in similar impacts to wildlife.

### **Alternative C (Preferred)**

Impacts to wildlife under this alternative would as described under alternative A. Residual impacts to wildlife would be minimal. Habitat restored as part of a well-developed reclamation plan could be as good as what existed prior to mining because of the alterations to the landscape that occurred due to farming and ranching over the past century.

No residual impacts to T&E or candidate plant or animal species are expected. BLM's North Dakota Field Office consulted with the FWS regarding T&E species. FWS responded by memo, dated 3/29/2002, that they were not aware of any T&E species listed for Mercer County frequenting the WMA. They concluded that FWS does not object to leasing the Federal coal tracts, consistent with BLM's 1988 Resource Management Plan. On 7/30/03 the BLM requesting an update from FWS on T&E consultation, as over a year has passed since the initial correspondence. The BLM North Dakota Field Office received a reply from FWS on 8/22/2003 confirming their earlier conclusion. There were no FWS candidate (Dakota skipper butterfly) or sensitive (western burrowing owl, Baird's sparrow) species observed during wildlife surveys conducted within the past three and one-half years in the WMA.

## **4.8 CULTURAL RESOURCES**

To members of Indian communities with historical ties to the project area, stones and stone features are often as im-

portant today as they were in the past. As these stone features are destroyed and remaining features isolated it becomes more difficult for Indian people to gain access to stone-feature sites for traditional purposes. Traditional cultural uses include conducting cultural ceremonies and the collection of culturally important plants located adjacent to the sites. Some of these plants are important as food items and symbols of tribal identity; others may have ceremonial and medicinal uses.

While there may be a tendency to suggest that large and small rings should be considered "more important" because their functions may have been other than tipi rings (see Stone Rings in Archeological Features, Appendix D), consulted American Indians have not rated various stone features differently. Therefore, in this analysis, all stone features are ascribed an equal value. The numbers that are adversely affected, avoided, or preserved, and the acres of cultural landscape surrounding them are enumerated (Table 4.1). Access to preserved sites is also addressed.

A programmatic agreement and management plan for the cultural resources was developed for Alternative C (Preferred), in compliance with the NHPA and North Dakota Century Code, in concert with the requirements of SMCRA as set forth in the North Dakota coal program. The management plan, Coteau: A Cultural Resource Management Plan for the West Mine Area, Mercer County, North Dakota was used for analysis of the alternatives.

For Alternative A (Proposed), Historic Properties would be avoided or mitigated by archeological investigation; there would be no active preservation of the sites. Under Alternative B, BLM would withdraw from further cultural resource regulation. Historic Properties, however, would be avoided or mitigated by archeological investigations as in the Proposed Action under the North Dakota Century Code in concert with the requirements of SMCRA. Under Alternative B there would be no active preservation of the sites

A distinction between avoidance and preservation is critical to this analysis. Under a programmatic agreement and approved management plan, designated lands within and adjacent to the WMA would be donated to the North Dakota Indian Cultural Education Trust and preserved for future generations.

The Indian Cultural Education Trust was conceived by Coteau and enacted by the North Dakota Legislature in 2003. The purpose of the Trust, managed by the North Dakota State Land Department, would be to hold lands containing cultural resource sites for protection and preservation and to generate income through grazing leases for educational activities of American Indians. The lands would be conveyed into the Trust under the terms and conditions of donor agreements amongst Tribes. Donor agreements make provisions for specific site protection measures to be implemented by

the tribes and required by the State Historical Society. Any restrictions on public access or land-use activities (e.g. the manner in which net income from the Trust would be disbursed to the tribes, which tribal representatives are to be contacted with regard to Trust matters, along with any other provisions deemed necessary by the parties to the donor agreement or the State Land Department) are contained in the agreement.

Long-term site protection would be afforded for specific sites through the lessee's acquisition of lands and donation to the trust for perpetual preservation. Funds accumulated in the Indian Cultural Education Trust would allow American Indians to carry on an understanding of traditional cultures to their own people—knowledge that might otherwise be lost across the generations. In this way the future would serve as a link to the past. American Indian access would be provided to preserved sites, allowing them visitation rights to conduct ceremonies and other activities as they see fit, further maintaining and enhancing their connection to the land. Through coordination with tribal representatives, a seed mixture containing traditional plant life would be sown on disturbed lands placed in the Trust. Such would be available for plant collecting and ceremonial use by American Indians, thereby enhancing the traditional connection to life on the Plains.

Under the Proposed Action (A) and the No Action (B) alternatives, sites that are avoided would remain in private ownership. It would be at the landowner's discretion whether sites would be preserved and the lands remain in native pasture. Under Alternative C (Preferred) these sites, along with additional sites, would be placed in a Trust for the protection of cultural resources and the landscape.

### **Alternative A (Proposed Action)**

The proposed action is to lease 5,571 acres of Federal coal beneath private surface. Leasing presupposes that the coal would be mined, resulting in direct effects to cultural resources. Under this action, physical disturbance of the only recorded unmarked burial would be stipulated for "No Surface Disturbance." To meet obligations under the NHPA, 14 Historic Properties located over Federal coal would be avoided or mitigated for their potential to yield scientific contributions to prehistory through planned archeological investigations in conjunction with 26 other prehistoric Historic Properties located over non-Federal coal within the WMA (Table 4.1). In addition, the only historical period Historical Property, 32ME189 would be mitigated through HABS/HAER documentation.

Approximately 5,323 acres and nine Historic Properties overlying Federal coal would be directly impacted (Table 4.1). Seven hundred eighty acres in the northwest corner of the WMA would be avoided. The 240 acres above Federal

coal in this area would be stipulated "No Surface Disturbance." Within this area, 12 Historic Properties and 17 other sites would be avoided. Elsewhere in the WMA, 170 other prehistoric sites and 52 historical period sites would be destroyed. Seven hundred eighty acres within the WMA that would be avoided by mining activities and those small areas not necessary for the mine operation would remain undisturbed during the life of the mine. After mining has been completed, land ownership would revert to private (non-corporate) ownership and access would be by landowner permission. None of the sites would be actively protected from adverse effects.

### **Alternative B (No Action)**

Under Alternative B, the application to lease Federal coal would be rejected and Federal coal reserves bypassed. Private surface over Federal coal would still be affected as non-Federal coal is mined. Historic Properties located on private and State coal leases would be mitigated under North Dakota Century Code in concert with the requirements of SMCRA as set forth in North Dakota's coal program. Coteau and the State of North Dakota would determine the management of cultural sites and landscape, Traditional Cultural Properties, and the only recorded unmarked burial. BLM would not be involved. For analysis purposes it is assumed that Historic Properties would be avoided or mitigated by archeological investigations as under Alternative A.

Direct and indirect impacts within the highwall buffer zone could destroy 102 stone rings, 85 cairns, one stone alignment, and two rock depressions. Historic Properties over Federal coal that could be affected or destroyed are 32ME108, 32ME156, 32ME206, 32ME209, 32ME1554, and 32ME1577. This amounts to some 43 percent (6 of 14) of the Historic Properties located above Federal coal. Current plans for the initial mining phase show important effects to the cultural landscape and similar impacts to cultural features. The effects are difficult to estimate, but it is known that proposed haul roads could impact two additional Historic Properties, 32ME238 and 32ME1513.

Coteau's current operation plans indicate that some 57 percent (8 of 14) of the Historic Properties located above Federal coal are likely to be destroyed under the No Action Alternative. For all cultural resources within the WMA, 46 percent of the stone rings (204 of 444), 59 percent of the stone cairns (98 of 167), 15 percent of the stone alignments (1 of 13), and 100 percent of the stone lined depressions (2 of 2) located above Federal coal could be destroyed by mining activities, even if no Federal coal is leased.

For this analysis it is assumed that the PSC would require avoidance of the same 780 acres within the WMA as under alternatives A and C. Within this area, 12 Historic Proper-

**Table 4.1**  
**Historic Properties Within the WMA**  
**CMS is a cultural material scatter**

NR Archaeo Site	Minerals	Avoid/Preserve or Mitigate	Stone Rings	Stone Cairns	Stone Alignments	Stone Lined Depressions	Cultural Material Scatter/Other
32ME108	FEDERAL	M	5				
32ME1474	PVT	M					CMS
32ME1475	PVT	M	1	1			
32ME1476	PVT	M	15	7			
32ME1478	PVT	M	4	3			
32ME1482	PVT	M	1				
32ME1483	PVT	M	7				
32ME1488	PVT	M	6				
32ME1491	PVT	M	22	7			
32ME1493	PVT	M	54	3			
32ME1513	FEDERAL	M	100	12	1		
32ME153	FEDERAL	M	83	7			
32ME1539	FEDERAL	A/P	1	2			
32ME1554	FEDERAL	M	27	1	1		
32ME156	PVT/FEDERAL	M	36	2			
32ME1562	PVT	A/P	27	4			
32ME1571	PVT	M	7	3			
32ME1577	PVT/FEDERAL	A/P	28	2			
32ME1578	PVT	A/P	1	1			
32ME1579	PVT	A/P	2	1			
32ME1580	PVT	A/P	1				
32ME1589	FEDERAL	M	1	9	6		
32ME167	PVT	M	11	1			
32ME169	PVT	M	16	1			
32ME171	PVT	M	3	1			
32ME182	FEDERAL	A/P	14	1			
32ME184	FEDERAL	A/P	8	2			
32ME185	PVT	A/P					CMS
32ME186	PVT	A/P	4				
32ME187	PVT	M		1			
32ME188	PVT	A/P					CMS
32ME206	FEDERAL	M	19	10	1	1	
32ME209	PVT/FEDERAL	M	24	1	1		
32ME232	PVT/STATE	M	27	23			
32ME233	STATE	M	13	6			
32ME238	FEDERAL	M	2	1			
32ME754	PVT	M	37	3			
32ME755	PVT	M	27	2			
32ME757	PVT	M	18	1			
32ME1486	FEDERAL	A/P					EFFIGY
32ME189	PVT	M					FARMSTEAD
<b>TOTALS</b>	<b>41</b>	<b>41</b>	<b>652</b>	<b>119</b>	<b>10</b>	<b>1</b>	<b>3</b>

ties and 17 other archeological sites would be avoided. Twenty-three fewer sites, 168 fewer stone rings, seven fewer stone cairns, and nine fewer stone alignments could be affected if Federal coal is not leased. While Table 4.2 indicates that 3,980 acres are avoided, major effects could occur on cultural sites from activities associated with mining, overburden stockpiling, haul roads, stock ponds and the like. As in Alternative A, after mining is completed land ownership would revert to private (non-corporate) ownership and access would be by permission only. None of the sites would be actively protected from future disturbances.

## Alternative C (Preferred)

Alternative C proposes leasing 5,571 acres of Federal coal beneath private surface. The 240 acres above Federal coal in the northwest of Section 4, (T. 145 N., R. 88W.), and eight acres within Section 14 (T. 145 N., R. 88W.) would be stipulated as “No Surface Disturbance” to protect 12 Historic Properties, 17 other archeological sites, the Traditional Cultural Property (32ME1486 effigy) and the unmarked burial site. Under a programmatic agreement and its management plan, Alternative C includes the donation 1,720 acres and approximately \$200,000 for the benefit of the North Dakota State Indian Cultural Education Trust. This includes the above-mentioned 240 acres, all 640 acres of Section 9 (T145N, R. 88W), and 240 acres of Section 14 (T145N, R. 88W) all within the WMA and 600 additional acres outside the WMA, which includes the National Register Boeckel-Renner and Bee’s Nest sites.

Donor agreement(s) would provide for a donation of lands to the trust holding five (32ME182, 32ME184, 32ME1539, 32ME1486, and 32ME1577) of 14 Historic Properties located above Federal coal. In addition, lands holding seven of the 29 Historic Properties located above private or state coal within the WMA would be donated to the trust with similar provisions, including 32ME185, 32ME186, 32ME188, 32ME1562, 32ME1578, 32ME1579 and 32ME1580. Also within donor agreements, two regionally important Historic Properties, the Boeckel/Renner Site (32ME799), which contains a burial mound complex and stone features as well as a portion of the Bee’s Nest Site (32ME175), which contains the remains of Raven Chief, an important Mandan leader, would be preserved. The Boeckel/Renner and Bee’s Nest sites are located outside the WMA. A total of 26 non-Historic Properties would also be preserved.

Donor Agreements would place 1,720 acres into the education trust. Approximately 1,200 acres of this land would be undisturbed, retaining approximately 431 stone features including 327 stone rings, 93 stone cairns, and 11 stone alignments. The only recorded Traditional Cultural Property (32ME1486 effigy) and a 200 ft buffer surrounding the features would also preserve an unmarked burial in the WMA.

Five additional burials/burial mounds would also be preserved at the Boeckel/Renner and Bee’s Nest sites. Donor agreements would provide access to these sites. These sites are presently on land that is in private ownership.

Alternative C is the only one that actively preserves sites through the Indian Cultural Education Trust. Implementation of the Programmatic Agreement and Management Plan for the WMA with addition of the Boeckel-Renner and Bee’s Nest sites greatly increases the acreage and archeological features preserved under Alternative C. Including donations to the trust, 105 more stone rings, 53 more stone cairns, (but 5 fewer stone alignments) are preserved than are avoided under Alternative B (see Table 4.2). In addition to physical site preservation, Alternative C would protect American Indian heritage for the future and allow free access by American Indian tribes to such lands for traditional and spiritual activities and collection of traditional plants where access may have been previously denied or limited.

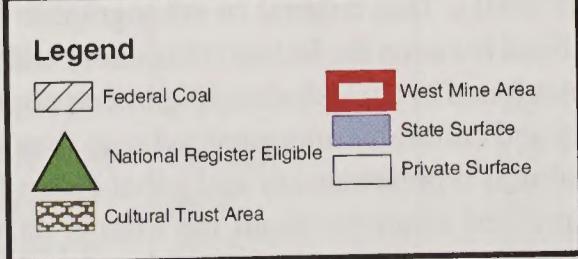
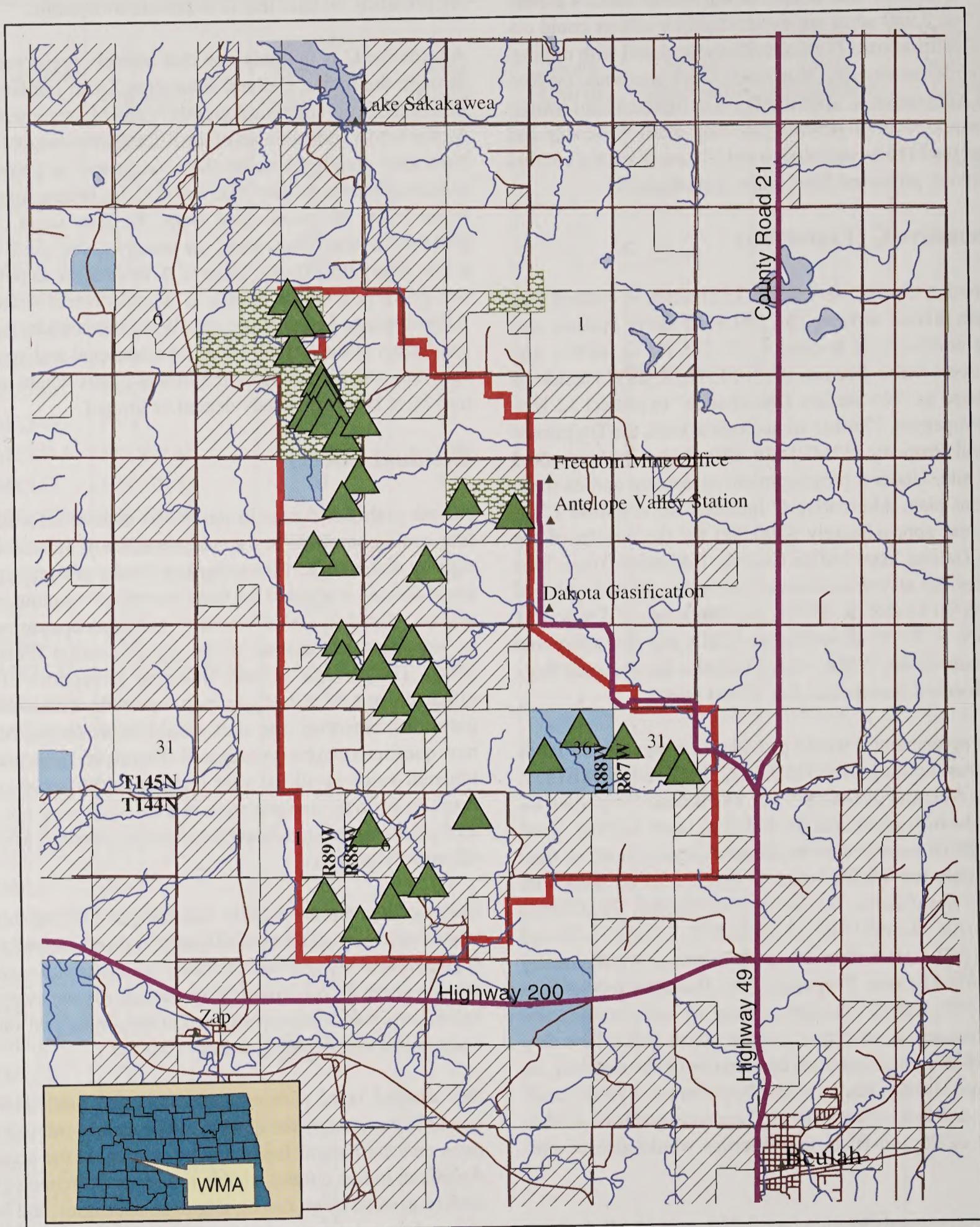
## Residual Effects

All the prehistoric sites in the WMA contain information that could contribute to the interpretation of cultural heritage by archeological investigation. Under present regulations sites are evaluated for their potential to contain information related to a set of research questions determined to be important at the time of the site evaluation (Peterson 2000). The passage of time, changing perceptions of significance, or new techniques may supersede these research questions. However, the sites would be destroyed before new questions can be investigated. Therefore, there may be inherent value in all the sites and their destruction could result in residual impacts even if such sites were not currently determined significant (i.e. National Register Eligible Historic Properties).

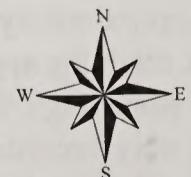
Even on sites that are eligible and mitigated through excavation, recovery of all available information is usually not accomplished because sites are rarely completely excavated. No site in the WMA would be systematically excavated in its entirety. Information contained in remaining portions of a site is lost when mining destroys the site.

The societal bond with past ancestors and past lifeways would be severed by the destruction of visible cultural features and the natural landscape by mining of the coal. In American Indian culture, visible remnants of archeological sites (e.g. stone rings, cairns, alignments, effigies, and burials) and the site’s relationship to the natural landscape are sacred (Deaver 2001). This cultural or ethnographic landscape forms a bond between the Indian community and their ancestors. Stones found in circles/cairns/alignments continue to be as ritually and culturally important today as they were in the past. Cultural representatives and tribal elders have repeatedly expressed concerns about the effects on their

**Figure 4.1**  
**West Mine Area Showing Location of Historical Properties and Federal Coal Tracts**



Miles  
 0 1 2 4



No warranty is made by the BLM for the use of the data for purposes not intended by BLM

**Table 4.2**  
**Adverse Effects and Sites Avoided or Preserved**  
**Preferred Alternative includes sites outside of the WMA donated as part of the**  
**Cultural Resource Management Plan**

	PROPOSED ACTION ALTERNATIVE (A) WMA / FED COAL ONLY	NO ACTION (B) WMA / FED COAL ONLY	PREFERRED ALTERNATIVE (C) TRUST / FED COAL ONLY
<b>ADVERSELY AFFECTED</b>			
Acres	16,271 / 5,323	13,971 / 2,371	16,271 / 5,323
Historic Properties	29 / 9	29 / 9	29 / 9
Sites	222 / 79	199 / 57 +	222 / 79
Rings	1157 / 379	989 / 187+	1157 / 379
Cairns	372 / 148	365 / 127+	372 / 148
Alignments	14 / 13	5 / 4+	14 / 13
Depressions	9 / 2	9 / 2+	9 / 2
Effigies	0 / 0	0 / 0	0 / 0
Burials	0 / 0	0 / 0	0 / 0
CMS	5 / 3	6 / 0+	5 / 3
<b>AVOIDED OR PRESERVED</b>			
	(AVOIDED)	(AVOIDED)	(PRESERVED)
Acres	780 / 248	3,980 / 3,200	1,325* / 313**
Historic Properties	12 / 5	12 / 5	14 / 6
Sites	29 / 12	52 / 34	38 / 13
Rings	128 / 65	222 / 194	327 / 115
Cairns	33 / 19	40 / 40	93 / 49
Alignments	7 / 0	16 / 9	11 / 4
Depressions	0 / 0	0 / 0	0 / 0
Effigies	1 / 1	1 / 1	1 / 1
Burials	1 / 1	1 / 1	7 / 2
CMS	5 / 1	5 / 1	5 / 1

+ Haul roads, stockpiles, could affect an unknown number of additional sites

\* Includes 480 acres for Boeckel-Renner and Bee's nest sites.

\*\* Includes 65 acres of the Bee's Nest site.

communities of losing these cultural resources. Mitigation is not a reality given this belief system. As a result, residual impacts would occur.

tion they contain. One site, the Ricker Farmstead, is listed based on its architectural merit. That site would be destroyed after HABS/HAER documentation. Historic features such as this farmstead, windmills, quarry sites and bridge would no longer be visible as mining removes the structures.

The amount of residual impact is reflected in the total number of sites and features overrun by coal mining activities. Acres disturbed by mining are a means to quantify residual impacts. If impacts are mitigated they no longer are considered residual. Long-term preservation of sites and landscapes could be a means to mitigate for cultural resources. Avoidance of sites and landscapes is not the same as long term mitigation since there is no way to assess whether the sites would be adversely affected by future actions. So, within the context of this analysis the numbers of impacted sites should be balanced with the numbers preserved/mitigated.

No historic-period sites (n=50) were determined eligible for listing on the National Register for archeological informa-

**Table 4.3**  
**Prehistoric Sites of the West Mine Area**

Prehistoric Sites	WMA	Above Federal Coal
National Register eligible	40	13
Not eligible	161	50
<b>TOTAL</b>	<b>201</b>	<b>63</b>

**Table. 4.4**  
**Acres, Historic Properties, Sites, and Features Listed by Alternative**

<b>ADVERSELY AFFECTED</b>	<b>PROPOSED ACTION (A) WMA / FED COAL ONLY</b>	<b>NO ACTION (B)* WMA / FED COAL ONLY</b>	<b>PREFERRED ALTERNATIVE (C) WMA/ FED COAL ONLY</b>
Acres	16,271 / 5,323	13,971 / 2,371	16,271 / 5,323
Historic Properties	29 / 9	29 / 9	29 / 9
Sites	222 / 79	199 / 57 +	222 / 79
Rings	1,157 / 379	989 / 187 +	1,157 / 379
Cairns	372 / 148	365 / 127+	372 / 148
Alignments	14 / 13	5 / 4 +	14 / 13
Depressions	9 / 2	9 / 2+	9 / 2
CMS	5 / 3	6 / 0	5 / 3

\* Records only the portion within the 500 ft high wall buffer.

Counts of adversely affected sites, features, and acres are given in Table 4.4 by alternative. Within the Preferred Alternative, Table 4.4 counts those sites mitigated and avoided. Under all three alternatives, it is assumed that the TCP effigy site and a single recorded burial would be left undisturbed.

### **Alternative A (Proposed Action)**

This alternative has the most residual effect on the landscape, historic properties, sites and features. All of the landscape, historic properties, sites and features could be adversely affected by mining activities except for the 780 acres in the WMA's northwest corner and around the TCP and unmarked burial that would be avoided by mining operations. This area contains 11 Historic Properties and 18 additional sites. Those sites and lands avoided by mining would remain in private ownership and use.

### **Alternative B (No Action)**

Under this alternative Federal coal is not leased but residual effects may still occur on Federal tracts because of the highwall buffer zone and related activities. The State of North Dakota would require archeological investigations for those sites determined to be Historic Properties. The 780 acres would be avoided as in the Proposed Action. Those features and lands avoided by mining would remain in private ownership and use. Because of the highwall buffer zone there are only a few sites and features excluded from being affected by not leasing Federal coal.

### **Alternative C (Preferred)**

This alternative would have the same residual effect as the Proposed Alternative except for its mitigation measures. The

780 acres that are avoided in alternatives A and B, an additional 545 acres within the Boeckel/Renner and Bee's Nest sites located outside the WMA, and approximately 395 disturbed acres would be donated to the North Dakota Cultural Education Trust as mitigation for resource and landscape loss. This is in addition to cultural resource investigations of Historic Properties within the WMA but outside the 780 acres.

As residual impacts are unavoidable impacts that cannot be mitigated this alternative provides substantially fewer residual impacts than Alternatives A or B because of mitigation measures. This is supported by Table 4.5 showing sites avoided or preserved by alternative.

With Alternative C, effects are greater than Alternative B but equal to the Proposed Action (A). This is offset by the addition of sites from outside the WMA within the North Dakota Indian Education Trust. Under Alternative C, sites are preserved and accessible rather than being avoided and remaining in private ownership with no control over their disturbance or accessibility. Even with greater adverse effects than Alternative B, Alternative C would have fewer residual impacts on the landscape and archeological remains.

It was found that significant impacts occur to cultural resources under all three alternatives. Because the surface is privately owned and the Federal coal reserves are not contiguous, ancillary activities associated with mining would destroy a significant number of prehistoric American Indian stone features whether Federal Coal is leased or not. Through consultation with Tribal representatives it was determined that mining of the coal would affect the Hidatsa, Mandan, Arikara, Sioux, and Assiniboine. These Tribes have well documented historic ties to the area.

**Table 4.5**  
**Avoided Sites are Retained in Private Ownership**  
**Preserved sites are placed in the North Dakota Indian Education Trust for preservation**

AVOIDED OR PRESERVED	PROPOSED ACTION (A)	NO ACTION ALTERNATIVE (B)	PREFERRED ALTERNATIVE (C) WITH ADDITION OF TRUST LANDS OUTSIDE WMA TRUST/FED COAL
	WMA / FED COAL	WMA / FED COAL	
Acres	780 / 248	3,980 / 3,200	1,325 / 313
Historic Properties	12 / 5	12 / 5	14 / 6
Sites	29 / 12	52 / 34	38 / 13
Rings	128 / 65	222 / 194	327 / 115
Cairns	33 / 19	40 / 40	93 / 49
Alignments	7 / 0	16 / 9	11 / 4
Depressions	0 / 0	0 / 0	0 / 0
Effigies	1 / 1	1 / 1	1 / 1
Burials	1 / 1	1 / 1	7 / 2
CMS	5 / 1	5 / 1	5 / 1

## Cumulative Effects

Arguably, there is inherent value in all cultural sites and their destruction would result in cumulative impacts through the loss of the resource from the mining of coal (see Residual Impacts). The loss of a natural landscape and its relationship to the sites is also a substantial and important impact, especially to American Indians who have been consulted (Deaver 2001).

The Cultural Resource Management Plan associated with the current undertaking is designed to explain the distribution of cultural sites within the WMA and across the “Coteau Mining Region.” The focus of this investigation is on the current record of previously permitted mining areas as well as additional field investigations within the WMA. Coteau plans to develop additional reserves (private coal) in Mine Area 2 North. Three geographic areas, (1) previous Freedom Mine investigations, (2) the WMA, and (3) Mine Area

2 North, including cultural and natural resources, may be defined as a cultural landscape (Figure 4.2).

The cultural landscape includes 68,683 acres that have been surveyed for archeological remains. The number of sites recorded is 740. These sites include some 1,950 stone rings, 541 cairns, and 61 other cultural material scatters or features.

Cumulative impacts are discussed in terms of past effects, effects of the current undertaking, and foreseeable effects of future mining actions of the Freedom Mine on site loss, sites mitigated, and acres disturbed. These categories can be defined in terms of the portions of the cultural landscape that directly relate to the three geographic areas (1) previous mining of the Freedom Mine, (2) WMA, (3) Mine Area 2 North. The cumulative impacts for cultural resources are shown in Table 4.6.

**Table 4.6**  
**Acres and Sites Affected by WMA Activity**

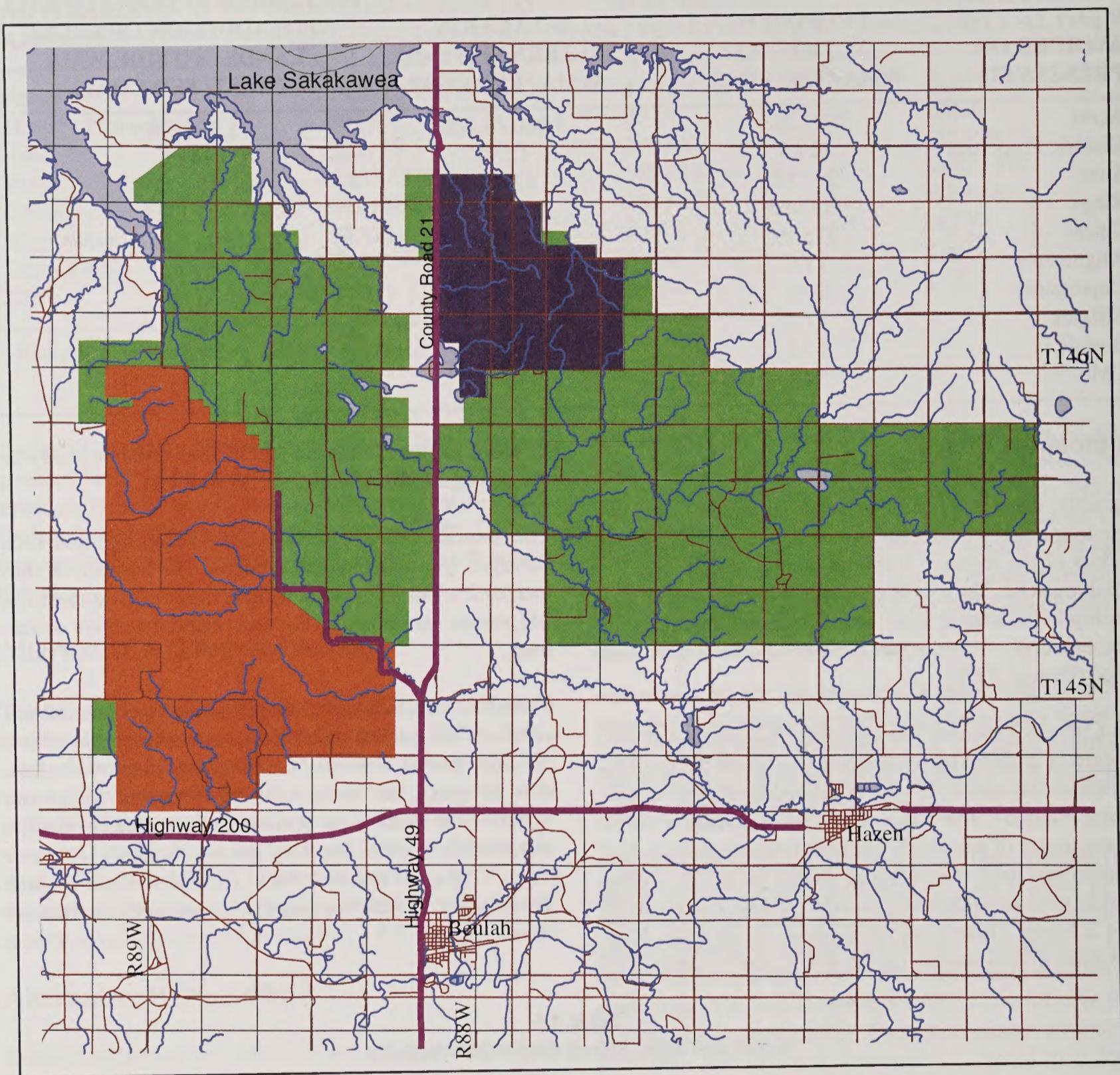
Coteau Mining Region	Mine Related Activities***	WMA Total / Federal Coal	Mine Area 2 North Total / Federal Coal
	Total / Federal Coal		Total / Federal Coal
Acres	68,683 / 14,043	45,214 / 8,412	17,051 / 5,571
Total Sites	740 / 189	427 / 98	251 / 91
Prehistoric Sites	470 / 133	238 / 70	198 / 63
Historic Sites	270 / 56	189 / 28	53 / 28
Stone Rings	1950 / 541	503 / 97*	1,285 / 444
Stone Cairns	541 / 197	112 / 30*	405 / 167
Other Features	61 / 28	34 / 7*	19 / 21
Sites Mitigated	Currently 60 / 8	19 / 3	41 / 5

\* Provided by Coteau

\*\* Federal Coal would be bypassed.

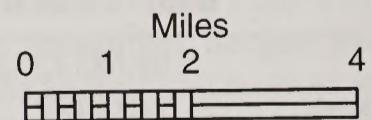
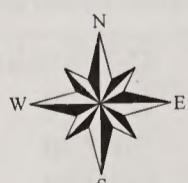
\*\*\* In addition to surface mining includes power plant, synfuels operation, and ancillary facilities.

**Figure 4.2**  
**Cultural Landscape of Coteau Mining Region**



**Legend**

- West Mine Area
- Mine Area 2 North
- Previous Freedom Mine Investigations



No warranty is made by the BLM for the use of the data for purposes not intended by BLM

Mine related activities encompass 45,214 acres. Within this area 422 sites have been affected. Sites 32ME175, 32ME158, 32ME 1463, and 32ME1528 or parts thereof have been avoided (Friedlander 2003). Nineteen sites have been excavated (Appendix A). In total, approximately 63 rings, 16 cairns, and 800 square meters outside of visible features were systematically excavated. One site was graded by a road patrol.

Depending on the alternative, between 13,971 and 16,271 acres would be adversely affected by mining within the WMA. Between 199 and 222 sites would be destroyed or affected by the mining (depending on alternative). These sites contain 652 stone rings, 119 cairns, and 14 other visible features. Forty-one sites within the WMA would be avoided, preserved, or mitigated under all alternatives. Under the Alternative C (preferred) donor agreements would preserve 11 Historic Properties and 18 other prehistoric sites in the Indian Education Trust; the TCP and unmarked burial would be preserved, and 28 archeological sites would be investigated.

The Mine Area 2 North would disturb some 6,418 acres and 62 sites. One hundred sixty-two stone rings, 24 cairns, and eight other visible features would be destroyed or affected by the mining. The one site, 32ME254, containing nearly half the visible features has already been investigated under a previous agreement.

In total, there would be cumulative impacts to approximately 69,000 acres affected by operations at the Freedom Mine. Approximately 740 sites, 447 prehistoric and 293 historic sites, would be destroyed or adversely affected by mining. Visible stone features including approximately 1,950 stone rings, 541 cairns, and 61 other identified features would be gone. For these sites within the Freedom Mine area, the Historic Properties were subjected to treatment plans complying with Section 106 of the National Historic Preservation Act.

## 4.9 ENVIRONMENTAL JUSTICE

### Impacts Common to All Alternatives

Input from all persons or groups-regardless of age, race, income status, or other social/economic characteristics-were considered. Consultation has been ongoing with representatives of the following tribes: Three Affiliated Tribes, Standing Rock Sioux Tribe, Yankton Sioux Tribe, Flandreau Santee Sioux Tribe, Winnebago Tribe, Northern Cheyenne Tribe, Crow Creek Sioux Tribes, and Lower Brule Tribe. Indian cultural representatives and elders have expressed concerns about the cumulative effects of mining operations on their communities (Deaver, 2001).

### Alternative A (Proposed Action)

For American Indians, the societal bond with past ancestors and lifeways would be severed by destruction of visible cultural features and the natural landscape. This is a substantial and important impact, especially to American Indians who have been consulted (Deaver, 2001). In addition, all prehistoric sites contain information that might contribute to understanding of cultural heritage through archeological investigation. Any information from these sites that is not retrieved under current mitigation plans would be lost to future generations. Under this alternative 5,323 surface acres above Federal coal would be disturbed.

### Alternative B (No Action)

Same as A but 2,371 acres would be disturbed.

### Alternative C (Preferred)

The same amount of acreage would be disturbed as under Alternative A but under this alternative cultural sites would be actively preserved through the Indian Cultural Education Trust (see Chapter 4 Cultural sections).

## 4.10 SOCIO-ECONOMICS

### Social

#### Alternative A (Proposed Action)

There would be social impacts to American Indians. These impacts would be greatest under Alternative A and are discussed in the Cultural section of this alternative.

#### Alternative B (No Action)

The level of mining would stay the same under this alternative. However, local officials are concerned that less money would be available to local governments for road maintenance, schools and other services if the Federal coal were not available. Effects to American Indians would be similar to Alternative A but less land would be affected (2,373 acres in alternative B compared to 5,323 acres in Alternative A).

#### Alternative C (Preferred)

There would be social impacts to American Indians. These impacts are discussed in the Cultural section of this alternative. Most importantly, under this alternative, access would be provided to cultural sites currently held in private ownership.

A trust fund for cultural education would be provided to Tribes to invest in their cultural and social heritage.

## Economics

Coteau would mine the WMA according to approved mining and reclamation plans under all three alternatives. As a result there would be little change in employment, however, the life of mining in the WMA would be determined by the availability of the Federal reserves.

### Alternative A (Proposed Action)

The leasing of 5,571 acres containing an estimated 90 million tons of Federal coal would permit the maximum economic recovery of the Federal coal and the intermingled non-Federal coal. Leasing would promote resource conservation and provide the continued payment of the State's share of the Federal coal royalties from the mine.

### Alternative B (No Action)

Federal coal would not be offered for lease, however, mining would continue to supply existing contracts. There would be no change in employment or production in the short term but mining in the WMA would be shortened due to the loss of reserves and Federal royalties from 90 million tons of unleased Federal coal would be foregone. The cost of mining non-Federal coal would increase and the ultimate recovery of the non-Federal coal would decrease.

### Alternative C (Preferred)

Impacts would be the same as under Alternative A; mining would proceed according to approved mining and reclamation plans. The life of mining in the WMA would be determined by the availability of the Federal reserves.

If Federal coal is not leased, loss of state and Federal revenues would occur and a nonrenewable resource (coal) would not be utilized.

## 4.11 REGULATORY COMPLIANCE, MITIGATION AND MONITORING

All alternatives assume that proper mining and reclamation would be carried out in accordance with existing state and Federal regulations. PSC has primacy over surface mining and reclamation and oversees all aspects of operations. Bonding is required of companies through all phases of mining and reclamation.

Sedimentation ponds and wetlands constructed during reclamation would compensate for mitigation of any wetland habitat removed during mining. North Dakota's law man-

dating "no net loss" of wetlands and Federal Executive Order 11990, dictating wetland protection, require that habitat losses be completely compensated through the reclamation process.

Native prairie and wood/shrub habitat removed by mining would be replaced according to surface owner preference statements. Details on reclamation plans would be worked out between the lessee and PSC in the PAP, with review and approval by appropriate state and Federal agencies.

Prime farmlands would be handled according to the performance standards found in the Rules Governing the Reclamation of Surface-Mined Land by the PSC.

## 4.12 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The major commitment of resources would be the mining and burning of coal for electrical generation and synfuels production. It is estimated that one to two percent of the energy produced would be required to mine the coal. This energy would be irretrievably lost. Mining the coal seam would remove a ground water aquifer.

Croplands would suffer an irretrievable loss of forage and crop production; rangelands face loss of forage for domestic and wildlife grazing during mining and early reclamation. The soil profile would be changed on areas disturbed by mining and subsequent reclamation. Soil forming processes, although continuing as soil material is replaced over reshaped overburden, would be irreversibly altered. Replaced soil would be unlike any found in a natural setting.

Mining would disturb the general topography with its pattern of cropland, native prairie, wetlands, and wood/shrub areas. Reclamation would forge a new landscape with its own character.

Any loss of wildlife or human life due to mining and reclamation would be an irretrievable commitment of resources.

For American Indians and local residents, the societal bond with past ancestors and lifeways would be severed by destruction of visible cultural features and the natural landscape. All prehistoric sites within the WMA contain information that might contribute to understanding of cultural heritage through archeological investigation. Any information from these sites that is not retrieved under current mitigation plans would be lost to future generations. Accidental destruction of unknown cultural resources would be irreversible and irretrievable as well.

Action alternatives A (proposed) and C (preferred) have the same irreversible and irretrievable commitments of cultural resources on Federal tracts. Alternative C would mitigate the loss of cultural resources through a cultural trust. Alternative B (No Action) has the fewest irreversible and irretrievable commitments of cultural resources, even though substantial impacts would occur above unleased Federal coal tracts.

To summarize the numbers of sites and features affected: Alternatives A and C would impact the same number of cultural resources. Alternative B would result in a substantial loss of resources, though fewer than under either action alternative. The exact number of features affected under alternative B is difficult to quantify because of incidental impacts.

Mining under either action alternative (A or C) would disturb 5,323 surface acres above Federal coal compared to 2,371 surface acres under Alternative B. Nine Historic Properties would be destroyed under any of the alternatives. Seventy-nine cultural sites would be destroyed under A or C, while 57 sites would be destroyed under B. Selection of Alternative B would affect half the number of stone rings (187 vs. 379) compared to alternatives A or C. Alternatives A or C would affect 148 stone cairns; 127 stone cairns would be affected by B. Thirteen stone alignments would be destroyed under alternatives A or C compared to 4 under B. Two stone-lined depressions would be destroyed under any alternative. Finally, alternatives A or C would destroy 3 cultural material scatters while no scatters would be affected under Alternative B.



# 5.0 CONSULTATION AND COORDINATION

**Table 5-1**  
**Federal and State Agencies Consulted**

North Dakota Health Department, Division of Air Quality, Bismarck, North Dakota  
State of North Dakota, State Historical Society, Bismarck, North Dakota  
State of North Dakota, Public Service Commission, Reclamation Division, Bismarck, North Dakota  
US Fish and Wildlife Service, North Dakota State Office, Bismarck, North Dakota  
Army Corps of Engineers, Bismarck, North Dakota  
Coteau Properties Company, Bismarck, North Dakota

**Table 5-2**  
**List of Contributors and Reviewers**

Name	Project Responsibility
<b>BLM North Dakota Field Office</b>	
Mike Nash	Technical Review
<b>BLM Montana State Office</b>	
Randy Heuscher	Solid Minerals Coordination
Rebecca Spurgin	Coal Program Coordination
John Thompson	NEPA Coordinator
Gary Smith	Cultural Resources Coordination
Gayle Sitter	Wildlife Coordination
<b>Office of Surface Mining Reclamation and Enforcement Western Regional Coordinating Center</b>	
Floyd McMullen	EIS Project Coordinator
Foster Kirby	Archaeologist

**Table 5-3**  
**List of Preparers**

Name	Education/Experience	Responsibility
<b>BLM North Dakota Field Office</b>		
Lee Jefferis	M.S., B.S. Geology 30 years professional experience	EIS Project Leader Water Resources
Barry Williams	M.A., B.A. Anthropology 30 years professional experience	Cultural Resources
Don Rufeldt	B.S. Resource Management (Soils) 30 years professional experience	Soils, Land Use, Vegetation, Wildlife
Mary Ramsey	B.A Communications 4 years professional experience	Writer/Editor
<b>BLM Montana State Office</b>		
Joan Trent	B. A. Psychology M.A. Environmental Science 30 years professional experience	Social Environmental Justice
Ed Hughes	B.S. Mineral Economics 30 years professional experience	Economics
<b>BLM Wyoming State Office</b>		
Susan Caplan	B.S. Meteorology M.S. Air Resource Management 19 years professional experience	Air Quality /Climate

**Table 5-4**  
**Tribal Organizations Consulted**

Three Affiliated Tribes	Lower Brule
Standing Rock Sioux Tribe	Crow Creek Sioux Tribe
Fort Peck Tribe	Northern Cheyenne Tribe
Fort Belknap	Winnebago Tribe
Oglala Sioux Tribe	Santee Sioux Tribe of Nebraska
Rosebud Sioux Tribe	Flandreau Santee Sioux Tribe
Yankton Sioux Tribe	



## 6.0 REFERENCES CITED

### Ahler, Stanley A., Thomas D. Thiessen, Michael K. Trimble

1991 People of the Willows; The Prehistory and Early History of the Hidatsa Indians. University of North Dakota Press, Grand Forks.

### American Indian Relief Council Web Site

2003 <http://www.airc.org/reservations/index.html>

### Artz, J. A.

1989 Southwest Pipeline Archaeology: Further Investigations at the Goodman Creek (32ME796) and Boeckel-Renner (32ME799) Sites, Mercer County, North Dakota. Department of Anthropology, University of North Dakota, for North Dakota State Water Commission, Bismarck.

### Boughton, J.

1999 Cultural Investigations along the Montana Segment of the Express Pipeline. Volume 7: Stone Ring Investigations Including the Lonesome Lake Traditional Cultural Property and Archaeological district along the Express Pipeline in Montana. Ethnoscience for Express Pipeline, Calgary, Alberta, Canada.

### Boughton, J., B. Fandrich, L. Litwinionek, L. A. Peterson and L. M. Peterson

2000 Coteau Properties Company: Testing and Criterion D Evaluation of Prehistoric Sites Located in Permit Extension Areas D and H and the West Permit Area, Mercer County, North Dakota. Ethnoscience for Coteau Properties Company, Bismarck, North Dakota.

### Boughton, J. M. and L. A. Peterson

1994 Testing and Evaluation of Prehistoric Sites within the North Mine Extension Area. Ethnoscience for Coteau Properties Co., Bismarck, ND.

### Boughton, J., L. Litwinionek and S. Walker-Kuntz

1999 Cultural Resource Inventory of Permit Areas D and H and the West Permit Area, the Coteau Mine, and Beulah, North Dakota. Ethnoscience for Coteau Properties Co., Bismarck, ND.

### Boughton, J. M., K. Vandersteen, L. A. Peterson, L. M. Peterson and J. Lieb

1996 Data Recovery of 13 Sites Located in the North Mine Extension Area, Mercer County, North Dakota. Ethnoscience for the Coteau Properties Co., Bismarck, ND.

### Bowers, A. W.

1950 Mandan Social and Ceremonial Organization. Chicago University Press, Chicago, IL.

1965 [1948] Hidatsa Social and Ceremonial Organization. Bureau of American Ethnology, Bulletin 194. Smithsonian Institution, Washington DC.

### Brown, J. E.

1983 The Unlikely Associates: A Study in Oglala Sioux Magic and Metaphysic. Studies in Comparative Religion 15(1-2): 92-100.

### Byrne, W. J.

1973 The Archaeology and Prehistory of Southern Alberta as Reflected by Ceramics. Archaeological Survey of Canada, Mercury Series Paper No. 14, Ottawa.

### Carlson, C. G.

1973 Geology of Mercer and Oliver Counties, North Dakota. North Dakota Geological Survey Bulletin 56, Part 1. Grand Forks, ND.

### Coteau Properties Company

2001 Federal Coal Lease Application, Freedom Mine, Mercer County, North Dakota.

### Crawley, M. E., and D. G. Emerson

1981 Hydrologic Characteristics and Possible Effects of Surface Mining in the Northwestern Part of West Branch Antelope Creek Basin, Mercer County, North Dakota: U. S. Geological Survey Open-File Report 81-79, p. 73.

### Dahlberg, J. C., J. Kjos and M. Schreiner

1984 Lignite Use and Development of the Lignite Industry in North Dakota. DSKS Research for AML Division, North Dakota Public Service Commission, Bismarck.

### Davis, L. B.

1975 The Indian Creek Coal Permit Area Crow Indian Reservation Montana: Archaeological, Ethnohistorical and Historical Heritage Baselines. Montana State University for Gulf Mineral Resources.

### Davis, T.

2000 Sustaining the Forest, the People and the Spirit. State University of New York Press, Albany.

### Deaver, K.

1980 Archaeological Site Distribution in North Blaine County, Montana. Professional Analysts for US Bureau of Land Management, Lewistown District, MT.

1983a Rings at the Johnson Bison Kill Site, 24PH8. In From Microcosm to Macrocosm: Advances in Tipi Ring Investigation and Interpretation, edited by L. B. Davis, pp. 59-70. Memoir 19. Plains Anthropologist 28(102) Pt. 2.

1983b Prehistoric Land Use Patterns. In Archeological Investigations on the Northern Border Pipeline, Montana Segment, Volumes 1-3: Interpretations, edited by Ken Deaver, pp. 10.1-10.44. Professional Analysts, Eugene, OR, for Northern Plains Natural Gas Co., Omaha, NE.

1990 Mitigation of Site 32ME220, Mercer County, North Dakota. Ethnoscience for Coteau Properties Co., Bismarck, ND.

**Deaver, K. and J. Brownell**

1992 Cultural Resources Management Plan for the Coteau East Mine Area (Life-of-Mine Area). Ethnoscience and Headwaters Cultural Resources for Coteau Properties Co., Beulah, ND.

**Deaver, K. and S. Deaver**

1987 Dancing Grouse, A Tipi Ring Site in Central North Dakota. Ethnoscience for Falkirk Mining Company, Bismarck, ND.

**Deaver, K. and J. Morter**

1981 Site Distribution in the Fresno and Nelson Reservoir Areas, North Central Montana. Professional Analysts, Eugene, OR, for US Bureau of Reclamation, Upper Missouri Region, Billings, MT.

**Deaver, K. and K. P. Schweigert**

1988 Cultural Resource Management Plan for Coteau Freedom Mine (Life-of-Mine-Area). Ethnoscience and Cultural Research and Management, Inc., for Coteau Properties Co., Bismarck, ND.

**Deaver, K. and S. Deaver**

1984 Archaeological Site Testing and Evaluation in the Bear Trap Canyon of Madison County, Montana. Ethnoscience for US Bureau of Land Management, Butte, MT.

**Deaver, K., S. Deaver and M. Bergstrom**

1989 Onion Ring, 32ME166, A Tipi Ring Site in Central North Dakota. Ethnoscience for Coteau Properties Co., Bismarck, ND.

**Deaver, S.**

1981 American Indian Religious Freedom Act: PL 95-341 Compliance for the Northern Border Pipeline in Montana. Professional Analysis for the Northern Border Pipeline Company, Omaha, NE.

1982 The American Indian Religious Freedom Act (AIRFA) and Montana Archaeology. Archaeology in Montana 23(1): 11-17.

1986 American Indian Religious Freedom Act (AIRFA) Background Data. Ethnoscience for US Bureau of Land Management, Montana State Office, Billings, MT.

1997 Point, Uniface, and Ceramic Variability in the Besant Phase. Archaeology in Montana 38(2) 11-38.

2001 Traditional Cultural Qualities of Sites in the Proposed Coteau Mine Expansion Area (Permit Areas D; H and the West Permit Area). Ethnoscience for Coteau Properties C., Bismarck, ND.

**Deaver, S. and Fandrich**

1999 American Indian Consultation for the Express Oil Pipeline Project: Montana and Wyoming Segments. Cultural Investigations along the Montana Segment of the Express Pipeline Ethnoscience for Express Oil, Inc., Calgary, Alberta, Canada.

**DeMallie, R. J.**

1984 (editor) The Sixth Grandfather: Black Elk's Teachings Given to John G. Neihardt. University of Nebraska Press, Lincoln, NE.

**Densmore, F.**

1918 Teton Sioux Music. Smithsonian Institution, Bureau of American Ethnology, Bulletin 61, GPO.

**Dorsey, G. A.**

1894 A Study of Siouan Cults. Eleventh Annual Report of the Bureau of Ethnology 11:361-544.

**Environmental Protection Agency**

2003 Dispersion Modeling Analysis of PSD Class I Increment Consumption in North Dakota and Eastern Montana. <http://www.epa.gov/region8/air/ndair.html>

**Ewers, J.C.**

1974 Ethnological Report on the Chippewa Cree Tribe of the Rocky Boy Reservation and the Little Shell Band of Indians. In Chippewa Indians VI, compiled by D.A. Horr, pp. 9-182. Garland Publishing, New York.

**FEMA, Region VIII**

2003 <http://www.fema.gov/regions/viii/tribal/turtlemountainbg.shtml>

**Friedlander, J.**

2003 (personal communication)

**Feraca, S. E.**

1963 Wakinyan: Contemporary Teton Dakota Religion. *Studies in Plains Anthropology and History*, Number 2, Browning, MT.

**Frison, G. C.**

1978 Prehistoric Hunters of the High Plains. Academic Press, New York.

1991 The Goshen Paleoindian Complex: New Data for Paleoindian Research. In *Clovis Origins and Adaptations*, edited by R. Bonnichsen and K. Turnmire, pp. 133-151. A Peopling of the Americas Publication, Center for the Study of the First Americans, Oregon State University, Corvallis.

**Fort Berthold Library Web Site**

2003 <http://fbcc-lsweb.fbcc.bia.edu/FortBerthold/TATMain.asp>

**Glassner, M.I.**

1974a The Mandan Migrations: Pre-Contact to 1876. *Journal of the West* 13(1):24-46.

1974b The New Mandan Migrations: From Hunting Expeditions to Relocation. *Journal of the West* 13(2):59-74.

**Groenwald, G. H.**

1980 Potential Hydrogeochemical Impacts of Surface Mining in the Northern Great Plains in *Surface Mining Hydrology, Sedimentology, and Reclamation*. University of Kentucky, Lexington, KY.

**Groenwald, G. H., and R. W. Rehm**

1979 Geology and Geohydrology of the Knife River Basin and Adjacent Areas of West Central North Dakota. North Dakota Geological Survey Report of Investigations No. 64.

**Gourneau, Patrick**

1993 History of the Turtle Mountain Band of Chippewa Indians. MS. on file. North Dakota Field Office, BLM. Dickinson, ND.

**Gregg, M. L.**

1985 An Overview of the Prehistory of Western and Central North Dakota. Bureau of Land Management Cultural Resources Series No. 1. U.S. Department of the Interior, Bureau of Land Management, Montana State Office, Billings.

**Gregg, M.L. and J.R. Hanson**

1983 Ethnographic Sketches of Northern Plains Indians. In *Class I Prehistoric Cultural Resources Inventory of the Dickinson District*, Bureau of Land Management, edited by M.L. Gregg and D. Davidson, pp. 15-65. University of North Dakota, Department of Anthropology and Archaeology, Contribution No. 203.

**Hewes, G.**

1961 Early Tribal Migration in the Northern Great Plains. *Plains Archaeological Conference Newsletter* 1:49-61.

**Historical and Archaeological Surveys, Inc. (HASI)**

1983 Final Report Cultural Resource Inventory of 760.8 Hectares (1,880 acres). The Coteau Properties Company's Mine Area D and E, and Evaluation of Four Formerly Recorded Historic Sites in Mine Area D, Mercer County, North Dakota. HASI for Coteau Properties Company, Bismarck, ND.

**Hoffman, J. J.**

1953 Comments on the Use and Distribution of Tipi Rings in Montana, North Dakota, South Dakota and Wyoming. *Montana State University, Anthropology and Sociology Papers* 14. Missoula.

**Howard, J. H.**

1954 Yanktonai Dakota Eagle Trapping. *Southwestern Journal of Anthropology* 10:69-74.

1972 Notes on the Ethnogeography of the Yankton Dakota. *Plains Anthropologist* 17:281-307.

1976 Yanktonai Ethnohistory and the John K. Bear Winter Count. *Plains Anthropologist, Memoir* 11.

1984 The Canadian Sioux. University of Nebraska Press, Lincoln, NE.

**Hughes, S.**

1987 The Mini-Moon Site (24DW85): A Besant Campsite in the Badlands of Eastern Montana. Report for Bureau of Land Management, Miles City, MT.

**Huitkrantz, A.**

1981 The Structure of Theistic Beliefs among North American Plains Indians. In *Belief and Worship in Native North America* by A. Hultkrantz, pp. 20-27. Syracuse University Press, Syracuse, New York, NY.

**Indian Health Service**

2003 <http://www.ihs.gov/FacilitiesServices/AreaOffices/Billings/FtPeck/fpsu-history.asp>

**Institute of American Indian Studies**

2003 <http://www.usd.edu/iais/>

**Joyes, D. C.**

1973 The Shippe Canyon Site. Archaeology in Montana 14(2): 49-85.

**Kehoe, T. F.**

1958 Tipi Rings: The "Direct Ethnological" Approach Applied to an Archaeological Problem. American Anthropologist (5):861-873.

1960 Stone Tipi Rings in North-Central Montana and the Adjacent Portion of Alberta, Canada: Their Historical, Ethnological and Archaeological Aspects. Bureau of American Ethnology, Bulletin 173. Washington, DC.

1961 Stone Tipi Rings. Antiquity: A Quarterly Review of Archaeology 35 (138):145-147.

**Kehoe, T. F. and A. B. Kehoe**

1959 Boulder Effigy Monuments in the Northern Plains. Journal of American Folklore 72:115-127.

**King, T. F.**

1999 In the Light of the Megis: The Chequamegon Bay Area as a Traditional Cultural Property. Report to the Bad River and Red cliff Bands of Lake Superior Tribe of Chippewa. Confidential report of limited distribution. Copies must be obtained either from the Red Cliff or Bad River Bands or from the author.

**Kloberdanz, T. J.**

1988 Volksdeutsche: The Eastern European Germans. In Plains Folk: North Dakota's Ethnic History, edited by Sherman, W.C. and P.V. Thorson, 117-181. North Dakota Institute for Regional Studies, North Dakota State University, Fargo.

**Lame Deer, J. (Fire) and R. Erdoes**

1972 Lame Deer Seeker of Visions. Washington Square Press, New York, NY.

**LaVardera, L. T.**

1984 Cultural Resources Survey of Mine Areas 1, 2 and 4. The Coteau Properties Company, Mercer County, North Dakota, Vol. 1. Report for Coteau Properties Co., Bismarck, ND.

**Loendorf, L. L. and J. L. Brownell**

1980 The Bad Pass Trail. Archaeology in Montana 21(3):11-102.

**Lowie, R. H.**

1910 The Assiniboine. Anthropological Papers of the American Museum of Natural History 4(I):1-269.

**Mails, T. E.**

1973 Sundancing at Rosebud and Pine Ridge. The Center for Western Studies, Augustana College, Sioux Falls, SD.

**Malainey, M. E.**

1991 Internal and External Relationships of Saskatchewan Plains Pottery Assemblages: Circa A. D. 1300 to Contact. Unpublished Masters Thesis, University of Saskatchewan, Saskatoon.

**Medicine Crow, J.**

1992 From the Heart of the Crow Country: The Crow Indians' Own Stories. Orion Books, New York, NY.

**Montana-Wyoming Tribal Leaders Council**

2003 <http://tlc.wtp.net/>

**Neihardt, J. G.**

1961 Black Elk Speaks. University of Nebraska Press, Lincoln, NE.

**Neuman, R. W.**

1975 The Sonota Complex and Associated Sites on the Northern Great Plains. Publications in Anthropology No. 6. Nebraska State Historical Society, Lincoln.

**NOAA**

1992 Monthly Station Normals of Temperature, Precipitation and Heating and Cooling Degree Days, 1961 – 1990.

2002 Monthly Station Normals of Temperature, Precipitation and Heating and Cooling Degree Days, 1971 – 2000.

**North Dakota Office of Indian Education**

2003 The History of the Turtle Mountain Band of Chippewa. <http://turtlemountainchippewa.com/history.htm>

**North Dakota Department of Health**

2003 CalPuff Analysis of Current PSD Class I Increment Consumption in North Dakota and Eastern Montana Using Actual Annual Average SO<sub>2</sub> Emission Rates. <http://www.health.state.nd.us/AQ/default.htm>

**Oihu, C. L.**

1978 A History of Coal Development in North Dakota. Unpublished Master's Thesis, University of North Dakota, Grand Forks.

**Peterson, L.**

- 2003 Coteau: A Cultural Resource Management Plan for the West Mine Area, Mercer County North Dakota, Draft. Ms on file. Bureau of Land Management, Dickinson.

**Peterson, L., John Boughton, Sherri Deaver, Luc Litwinionek**

- 2000 Cultural Resource Testing and Evaluation Plan for permit Extension Areas D and H and the West Permit Area, The Coteau Mine, Beulah, North Dakota. Ms. on file. Bureau of Land management, Dickinson.

**Peterson, L. M. and L. A. Peterson (editors)**

- 1995 The Bees Nest Site, Mitigation of a Multi-Component Stone Ring Site in Central North Dakota (Vol. 1). Ethnoscience for Coteau Properties Co., Bismarck, ND.

**Powers, W. K.**

- 1975 Oglala Religion. University of Nebraska Press, Lincoln, NE.
- 1982 Yuwipi: Vision and Experience in Oglala Ritual. University of Nebraska Press, Lincoln, NE.

**Public Service Commission, State of North Dakota**

- 2001 Rules Governing Reclamation of Surface-Mined Land. State Capitol, 12<sup>th</sup> Floor, Bismarck, North Dakota.

**Reeves, B. O. K.**

- 1970 Cultural Change in the Northwestern Plains, 1000 B.C. - A.D. 1000. Ph.D. Dissertation, University of Calgary, Canada.

**Robinson, E. B.**

- 1966 History of North Dakota. University of Nebraska Press, new Haven, CT.

**Rodnick D.**

- 1938 The Fort Belknap Assiniboine of Montana: A Study in Culture Change. Yale University Press, New Haven, CT.

**Sallet, R.**

- 1974 Russian-German Settlements in the United States, translated by Rippley, L.J. and A. Bauer. North Dakota Institute for Regional Studies, Fargo.

**Schneider, Mary Jane**

- 1994 [1986] North Dakota Indians: An Introduction. University of North Dakota. Kendal/Hunt Publishing Company. Dubuque, Iowa.

**Seinfeld, John H.**

- 1986 Atmospheric Chemistry and Physics of Air Pollution. John Wiley & Sons, New York.

**Spath, C. and R. C. Christensen**

- 1991a 32ME254, Evaluation and Intensive Testing. Metcalf Archaeological Consultants, Inc., for Coteau Properties Co., Bismarck, ND.
- 1991b Dakota Star Resource Cultural Resource Inventory, Mercer County, North Dakota. Metcalf Archaeology Consultants, Inc. for the Coteau Properties Company, Beulah, ND.

**Spirit Lake Nation Fish and Wildlife Department**

- 2003 <http://www.slnfwd.org/about.htm>

**SpiritLakeNation.com**

- 2003 <http://spiritlakenation.com>

**State Historical Society of North Dakota-Archaeology and Historic Preservation (SHSND-AHP)**

- 1990 North Dakota Historic Preservation Office Documents: Archaeological Opponents of the Comprehensive State Plan of Historic Preservation. Archaeological and Historic Preservation Division, State Historic Society of North Dakota, Bismarck.

**Stern, Arthur C, Henry C. Wohlers, Richard W. Boubel and William P. Lowry.**

- 1973 Fundamentals of Air Pollution. Academic Press, New York.

**Toom, D. L.**

- 1988 A Preliminary Statement on the Archaeology and Radiocarbon Dating of the Flaming Arrow Site (32ML4), McLean County, North Dakota. Journal of the North Dakota Archaeological Association 3:51-73.

**Trewartha, Glenn T. and Lyle H. Horn**

- 1980 An Introduction to Climate. McGraw-Hill, New York, 1980

**US Department of Commerce, Bureau of the Census**

- n.d. Information from published census reports, 1885-1980.

**USDI-BLM**

- 1988 North Dakota Resource Management Plan and Environmental Impact Statement, Dickinson, North Dakota.

**Voget F. W.**

- 1984 The Shoshoni-Crow Sun Dance. University of Oklahoma Press, Norman.

**Walde, D. A.**

1994 The Mortlach Phase. Unpublished Ph.D. Dissertation, Department of Archaeology, University of Calgary, Alberta.

**Walker, J. R.**

1917 The Sun Dance and Other Ceremonials of the Oglala Division of the Dakota. Anthropological Papers of the American Museum of Natural History 16:51-221.

1980 Lakota Belief and Ritual. University of Nebraska Press, Lincoln, NE.

1982 Lakota Society. University of Nebraska Press, Lincoln, NE.

1983 Lakota Myth. University of Nebraska Press, Lincoln, NE.

**Wettlaufer, B. N. and W. J. Meyer-Oakes**

1960 The Long Creek Site. Anthropological Series No. 2. Saskatchewan Museum of Natural History. Saskatchewan Museum of Natural History. Anthropological Series 2:82-85.

**Will, G. F.**

1928 Magical and Sleight of Hand Performances by the Arikara. North Dakota History 3(1):50-65.

1930a Arikara Ceremonials. North Dakota History 4(4):247-274.

1930b The Mandan Lodge at Bismarck. North Dakota History 5(1):38-48.

**Winham, R. R and E. Lueck**

1994 Cultures of the Middle Missouri. In Plains Indians A.D. 500-1500, edited by K. H. Schiesier, pp. 149-175. University of Oklahoma Press, Norman.

**Winzler, S., J. Boughton and L. M. Peterson**

1998 Data Recovery at 32ME254, Mercer County, North Dakota. Revised June 1998. Ethnoscience for Coteau Properties Co., Bismarck, ND.

**Wood, W. R. (editor)**

1967 An Interpretation of Mandan Culture History. Bureau of American Ethnology, Bulletin 198.

1986 Ice Glider, 32OL110. Special Publication of the South Dakota Archaeological Society, No. 10.

**Wood, W.R. and M. Liberty (editors)**

1980 Anthropology of the Great Plains. University of Nebraska Press, Lincoln.

**Woolworth Research Associates**

1974 A Final Report on an Archaeological/Historical Assessment Program for the North American Coal Gasification Project in Mercer County, ND. WRA for North American Coal Co., Bismarck, ND.

**Wyckoff, J. and D. D. Kuehn**

1983 Chapter 4. The Physiographic Background. In Archaeology of the Northern Border Pipeline, North Dakota: Part 1. Survey and Background Information, edited by Root, M. J. and M. L. Gregg, 135-176. University of North Dakota, Department of Anthropology, Contribution No. 194. Northern Border Pipeline Company, Omaha, NE.

## 7.0 GLOSSARY

**aboriginal** - Related to early or primitive cultures in a region.

**alluvial valley floor (AVF)** - An area of unconsolidated stream-laid deposits holding streams with water availability sufficient for subirrigation or flood irrigation agricultural activities (see 30 CFR 701.5).

**alternative** - In terms of the National Environmental Policy Act, one of several substitute or alternate proposals that a Federal agency is considering in an environmental analysis.

**ambient** - Surrounding conditions (or environment) in a given place and time.

**annual precipitation** - The quantity of water that falls yearly in the form of rain, hail, sleet, and snow.

**approximate original contour** - Post-mining surface configuration achieved by backfilling and grading of mined-out areas so that the reclaimed land surface resembles the general surface configuration of the land prior to mining (see 30 CFR 701.5).

**aquatic** - Living or growing in or on the water.

**aquifer** - A layer of permeable rock, sand, or gravel that stores and transmits water in sufficient quantities for a specific use.

**ash** - The residual non-combustible matter in coal that comes from included silt, clay, silica, or other substances. The lower the ash content, the better the quality of the coal.

**buffer zone** - An area between two different land uses that is intended to resist, absorb, or otherwise preclude development or intrusion between the two use areas.

**clinker (scoria)** - Baked and fused rock resulting from in-place burning of coal deposits.

**contiguous** - Lands or legal subdivisions having a common boundary, lands having only a common corner are not contiguous.

**cooperating agency** - An agency which has jurisdiction by law in an action being analyzed in an environmental document and who is requested to participate in the NEPA process by the agency that is responsible for preparing the environmental document [see 40 CFR 1501.6 and 1508.5].

**Coteau Properties Company** – a subsidiary of The North American Coal Corporation, is engaged in the mining of

coal used by electric utilities for power generation and by a coal gasification facility. Coteau's Freedom Mine in Beulah, North Dakota, began mining in 1983. Freedom Mine delivers over 16 million tons of coal per year, making it the largest lignite mine in the United States in deliveries. The operation utilizes two Bucyrus-Erie 2570 draglines for overburden removal and reclaims about 600 acres of land annually.

**cultural resources** - The remains of human activity, occupation, or endeavor reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that reveal the nature of historic and prehistoric human events. These resources consist of (1) physical remains, (2) areas where important human events occurred, and (3) the environment immediately surrounding the resource.

**cumulative impact** - The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

**deciview (dV)** - A general measure of view impairment (13 deciview equals a view of approximately 60 miles) caused by pollution.

**direct (primary) impact** - An impact caused by an action that occurs at the same time and place as the action (see 40 CFR 1508.8).

**discharge** - Any of the ways that ground water comes out of the surface, including through springs, creeks, or being pumped from a well.

**dragline** - A type of excavating crane that casts a rope- or cable-hung bucket a considerable distance, collects the dug material by pulling the bucket toward itself on the ground with a second rope or cable, elevates the bucket, and dumps the material on a backfill bank or pile.

**ecosystem** - A system formed by the interaction of a community of organisms with their environment.

**edaphic** - Related to or caused by particular soil conditions.

**erratic** - a rock fragment carried by a glacier or by floating ice and deposited when the ice melted at some distance from the outcrop from which the fragment was derived.

**erosion** - The wearing away of the land surface by running water, wind, ice or other geologic agents.

**excavation (archeological)** - The scientifically controlled recovery of subsurface materials and information from a cultural site. Recovery techniques are relevant to research problems and are designed to produce maximum knowledge about the site's use, its relation to other sites and the natural environment, and its significance in the maintenance of the cultural system.

**fair market value** - The amount in cash, or in terms reasonably equivalent to cash, for which in all probability a coal deposit would be sold or leased by a knowledgeable owner willing but not obligated to sell or lease to a knowledgeable purchaser who desires but is not obligated to buy or lease.

**fen** - A waterlogged, spongy groundmass containing alkaline, decaying vegetation characterized by reeds and which may develop into peat. It sometimes occurs in the sinkholes of karst regions. Cf: bog.

**floodplain** - The relatively flat area or lowland adjoining a body of flowing water, such as a river or stream, that is covered with water when the river or stream overflows its banks.

**forage** - Vegetation used for food by wildlife, particularly big game wildlife, and domestic livestock.

**glacial till** - Material deposited from glaciers consisting of an unsorted mixture of clay, sand, gravel, and boulders.

**ground water** - Subsurface water that fills available openings in rock or soil materials to the extent that they are considered water saturated.

**habitat** - A place where a plant or animal naturally or normally lives and grows.

**HABS/HAER** - Historic American Building Survey/Historic American Engineering Record

**hazardous waste** - Those materials defined in Section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, and listed in 40 CFR § 261.

**human environment** - The natural and physical environment and the relationship of people with that environment (see 30 CFR 1508.14).

**hydraulic conductivity** - The capacity of a medium to transmit water; permeability coefficient. Expressed as the volume of water at the prevailing temperature that will move in unit time under a unit hydraulic gradient through a unit area. Units include gallons per day per square foot, centimeters per second.

**hydraulic** - Pertaining to fluid in motion, or to movement or action caused by water.

**in-place coal reserves** - The estimated volume of all of the coal reserves in a lease without considering economic or technological factors that might restrict mining.

**interdisciplinary** - Characterized by participation or cooperation among two or more disciplines or fields of study.

**intermittent stream** - A stream that does not flow year-round but has some association with ground water for surface or subsurface flow.

**lease (mineral)** - A legal document executed between a mineral owner or lessor and another party or lessee which grants the lessee the right to extract minerals from the tract of land for which the lease has been obtained [see 43 CFR 3400.0-5(r)].

**lignite** - A soft coal, usually dark brown and often having a woody texture.

**loam** - A rich, permeable soil composed of a mixture of clay, silt, sand, and organic matter.

**maintenance tract** - A Federal coal tract that would continue or extend the life of an existing coal mine.

**maximum economic recovery (MER)** - The requirement that, based on standard industry operating practices, all profitable portions of a leased Federal coal deposit must be mined. MER determinations will consider existing proven technology; commercially available and economically feasible equipment; coal quality, quantity, and marketability; safety, exploration, operating, processing, and transportation costs; and compliance with applicable laws and regulations [see 43 CFR 3480.0-5(a)(24)].

**methane** - A colorless, odorless, and inflammable gas; the simplest hydrocarbon; chemical formula = CH<sub>4</sub>. It is the principal constituent of natural gas and is also found associated with crude oil and coal.

**mineable coal** - Coal that can be economically mined using present day mining technology.

**mining permit** - A permit to conduct surface coal mining and reclamation operations issued by the state regulatory authority pursuant to a state program or by the Secretary pursuant to a Federal program (see 30 CFR 701.5).

**mitigation** - An action to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

**National Register of Historic Places (NRHP)** - A list of districts, sites, buildings, structures and objects important in American history, architecture, archeology and culture maintained by the Secretary of the Interior. Expanded as authorized by Section 2(b) of the Historic Sites Act of 1935 (16 U.S.C. 462) and Section 101(a)(1) (A) of the National Historic Preservation Act.

**NEPA process** - All measures necessary for compliance with the National Environmental Policy Act of 1969 (see 40 CFR 1508.21).

**No Action alternative** - An alternative where no activity would occur. The development of a No Action alternative is required by regulations implementing the National Environmental Policy Act (40 CFR 1502.14). The No Action alternative provides a baseline for estimating the effects of other alternatives.

**outcrop** - A rock formation that appears at or near the surface; the intersection of a rock formation with the surface.

**overburden** - Material of any nature, consolidated or unconsolidated, that overlies a coal or other useful mineral deposit, excluding topsoil.

**perennial species (vegetation)** - Vegetation that lives over from season to season.

**perennial stream** - A stream or part of a stream that flows continuously during the calendar year as a result of groundwater discharge or surface runoff.

**permeability** - The ability of rock or soil to transmit a fluid.

**permit application package** - A proposal to conduct surface coal mining and reclamation operations on Federal lands, including an application for a permit, permit revision, or permit renewal and all the information required by SMCRA, the applicable state program, any applicable cooperative agreement, and all other applicable laws and regulations including, with respect to Federal leased coal, the Mineral Leasing Act and its implementing regulations.

**permit area** - The area of land, indicated on the approved map submitted by the operator with his or her application, required to be covered by the operator's performance bond under the regulations at 30 CFR Part 800 and which shall include the area of land upon which the operator proposes to conduct surface coal mining and reclamation operations under the permit, including all disturbed areas (see 30 CFR 701.5).

**point source (pollution)** - A point at which pollution is added to a system, either instantaneously or continuously. An example is a smokestack.

**prime and unique farmland** - Those lands, which are defined by the Secretary of Agriculture in 7 CFR, part 657 (*Federal Register* Vol. 4 No. 21) and which have historically been used for cropland (see 30 CFR 701.5).

**proposed action** - In terms of National Environmental Policy Act, the project, activity, or action that a Federal agency proposes to implement or undertake and which is the subject of an environmental analysis.

**qualified surface owner** - The natural person or persons (or corporation, the majority stock of which is held by a person or persons otherwise meeting the requirements of this section) who:

- (1) Hold legal or equitable title to the surface of split estate lands,
- (2) Have their principal place of residence on the land, or personally conduct farming or ranching operations upon a farm or ranch unit to be affected by surface mining operations; or received directly a significant portion of their income, if any, from such farming and ranching operations; and
- (3) have met the conditions of (1) and (2) above for a period of at least three years, except for persons who gave written consent less than three years after they met the requirements of both (1) and (2) above [see 43 CFR 3400.0-5(gg)].

**raptor** - Bird of prey, such as an eagle, falcon, hawk, owl, or vulture.

**recharge** - The processes by which groundwater is absorbed into a zone of saturation.

**reclamation** - Rehabilitation of a disturbed area to make it acceptable for designated uses. This normally involves regrading, replacement of topsoil, revegetation and other work necessary to restore the disturbed area for post-mining use.

**record of decision (ROD)** - A document separate from, but associated with, an environmental impact statement that publicly and officially discloses the responsible official's decision on the proposed action (see 40 CFR 1505.2).

**recoverable coal** - The amount of coal that can actually be recovered for sale from the demonstrated coal reserve base.

**resource management plan (RMP)** - A land use plan, as prescribed by FLPMA that directs the use and allocation of public lands and resources managed by BLM. Prior to selection of the RMP, different alternative management plans are compared and evaluated in an environmental impact statement (EIS) to determine which plan will best direct the management of the public lands and resources.

**revegetation** - The reestablishment and development of self-sustaining plant cover following land disturbance. This may occur through natural processes, or the natural processes may be enhanced by human assistance through seedbed preparation, reseeding, and mulching.

**riparian** - The area adjacent to rivers and streams that lies between the stream channel and upland terrain and that supports specific vegetation influenced by perennial and/or intermittent water.

**runoff** - That portion of rainfall that is not absorbed; it may be used by vegetation, lost by evaporation, or it may find its way into streams as surface flow.

**scoping** - A public informational process required by the National Environmental Policy Act to determine private and public concerns, scope of issues, and/or questions regarding a proposed action to be evaluated in an environmental impact analysis.

**scoria (clinker)** - Baked and fused rock resulting from in-place burning of coal deposits.

**sedimentation pond** - An impoundment used to remove solids from water in order to meet water quality standards or effluent limitations before the water leaves the permit area (see 30 CFR 701.5).

**semi-arid** - A climate or region characterized by little yearly rainfall and by the growth of a number of short grasses and shrubs.

**shale** - A very fine-grained clastic rock or sediment consisting predominately of clay-sized particles that is laminated, lithified, layered mud.

**significant impact** - A qualitative term used to describe the anticipated importance of impacts to the human environment as a result of an action.

**socio-economics** - The social and economic situation that might be affected by a proposed action.

**soil survey** - The systematic examination, description, classification, and mapping of soils in an area, usually a county. Soil surveys are classified according to the level of detail of field examination. Order I is the most detailed and Order V is the least detailed.

**spontaneous combustion** - The heating and slow combustion of coal and coaly material initiated by the absorption of oxygen.

**steppe** - Referring to extensive plains dominated by grasses.

**stipulations** - Requirements that are part of the terms of a mineral lease. Some stipulations are standard on all Federal leases. Other stipulations may be applied to specific leases at the discretion of the surface management agency to protect valuable surface resources or uses existing on those leases.

**surface disturbance** - Any disturbance by mechanical actions that alters the soil surface.

**threatened and endangered (T&E) species** - These species of plants or animals classified as threatened or endangered pursuant to section 4 of the Endangered Species Act. Any species, which is in danger of extinction, or is likely to become so within the foreseeable future.

**topography** - Physical shape of the ground surface; the configuration of land surface including its relief, elevation, and the position of its natural and manmade features

**transpiration** - The discharge of water vapor by plants.

**truck & shovel** - A mining method used to remove overburden and coal in a strip mining operation. Truck and shovel operations use large bucket-equipped digging and loading machines (shovels) and large dump trucks to remove overburden instead of using a dragline for overburden removal.

**unconfined aquifer** - An aquifer where the water table is exposed to the atmosphere through openings in the overlying materials.

**unsuitability criteria** - The 20 criteria described in 43 CFR 3461, the application of which results in an assessment of Federal coal lands as suitable or unsuitable for surface coal mining.

**wakan** – anything that is old or has existed for along time so that it should be accepted because it has been so in former times. It may mean a strange or wonderful thing or something that cannot be comprehended. It may mean a sacred or supernatural thing.

**waterfowl** - A bird that frequents water, especially a swimming bird.

**watershed** – The region or area drained by a river, stream, etc.; drainage area.

**West Mine Area** – A 17,000-acre parcel west of the Coteau's Freedom Mine that is being analyzed for surface mining operations. Approximately 5, 500 acres of the West Mine Area are underlain by Federal coal reserves.

**wetlands** - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient, under normal circumstances, to support a prevalence

of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands include marshes, bogs, sloughs, potholes, river overflows, mud flats, wet meadows, seeps, and springs [see 33 CFR 328.3(a)(7)(b)].

**wild and scenic river** - Rivers or sections of rivers designated by Congressional actions under the 1968 Wild and Scenic Rivers Act as wild, scenic, or recreational by an act of the Legislature of the state or states through which they flow.

**wilderness** - An area of undeveloped Federal land designated wilderness by Congress, retaining its primeval character and influence, without permanent improvements or human habitation, protected and managed to preserve its natural conditions and that (1) generally appears to have been affected primarily by the forces of nature with the imprint of man's work substantially unnoticeable, (2) has outstanding opportunities for solitude or primitive and unconfined recreation, (3) has at least 5,000 acres or is of sufficient size to make practical its preservation and use in an unimpaired condition, and (4) also may contain features that are of ecological, geological, scientific, educational, scenic, or historical value. Congress in the Wilderness Act of 1964 identified these characteristics.



# APPENDIX A

## PREVIOUS MINE MITIGATION EXCAVATION

SITE #	EXCAVATION TOTALS	REFERENCES
32ME0158	47 rings and 3 cairns tested; 3 rings trench excavated	Boughton et al 1994a; Boughton & Peterson 1994; Boughton et al 1996
32ME0163	Series of grader stripping passes	Dill 1978; HASI 1981; Bergstrom & Deaver 1988
32ME0166	excavated 13 rings, 5 cairns, 5 non-feature areas; 365.5m <sup>2</sup>	Dill 1978; Kuehn et al 1984; Deaver et al 1989
32ME0175	Excavated 14 rings, partial excavation of 7 rings; full excavation of 5 cairns; 5 block units outside of ring areas; 177m <sup>3</sup>	Dill 1978; LaVardera 1984; Deaver & Schweigert 1988; Peterson & Brownell 1989; Spath 1991a, b; Peterson & Peterson 1995
32ME0254	8 rings trenched; 3 rings fully excav; 1 cairn fully excav; 2 cairns partial excav; 40 1m x 1m units outside feature areas; 247m <sup>2</sup>	Dill 1978; LaVardera 1984; Spath et al 1991a; Peterson & Boughton 1997; Winzler et al 1998
32ME0797	2m x 5m excav block	Gregg et al 1985; Haury et al 1988; Larson 1992; Walker-Kuntz et al 1998; Walker-Kuntz & Boughton 1999
32ME1357	N-S x E-W trench in 3 rings	Boughton et al 1994a; Boughton & Peterson 1994; Boughton et al 1996
32ME1358	N-S X E-W trench in 1 ring	Boughton et al 1994a, 1994b; Boughton & Peterson 1994; Boughton et al 1996
32ME1364	20 1 x 1m units over cairn	Boughton et al 1994a, 1994b; Boughton & Peterson 1994; Boughton et al 1996
32ME1374	N-S x E-W trench in 1 ring; 3 1 x 1m units over cairn	Boughton et al 1994a; Boughton & Peterson 1994; Boughton et al 1996
32ME1376	N-S x E-W trench in 1 ring and assoc cairn	Boughton et al 1994a; Boughton & Peterson 1994; Boughton et al 1996
32ME1380	39 1 x 1m units in 1 ring	Boughton et al 1994a; Boughton & Peterson 1994; Boughton et al 1996
32ME1384	N-S X E-W trench in 1 ring	Boughton et al 1994a; Boughton & Peterson 1994; Boughton et al 1996
32ME1387	N-S X E-W trench in 2 rings	Boughton et al 1994a, 1994b; Boughton & Peterson 1994; Boughton et al 1996
32ME1392	N-S X E-W trench in 1 ring	Boughton et al 1994a, 1994b; Boughton & Peterson 1994; Boughton et al 1996
32ME1395	N-S X E-W trench in 1 ring	Boughton et al 1994a, 1994b; Boughton & Peterson 1994; Boughton et al 1996
32ME1402	N-S X E-W trench in 4 rings	Boughton et al 1994a, 1994b; Boughton & Peterson 1994; Boughton et al 1996
32ME1403	N-S X E-W trench in 1 ring; 96 1 x 1m units in 1 ring	Boughton et al 1994a, 1994b; Boughton & Peterson 1994; Boughton et al 1996
32ME1456	1 Partial ring excav; 43m <sup>2</sup>	Walker-Kuntz et al 1998; Walker-Kuntz & Boughton 1999

## References Cited for Appendix A

### Artz, J. A

1986 Southwest Pipeline Archaeology: Testing and Evaluation of 15 Sites in Mercer and Dunn Counties, North Dakota (Segments A, B-1, and B-2). University of North Dakota for North Dakota State Water Commission, Bismarck, ND.

1989 Southwest Pipeline Archaeology: Further Investigations at the Goodman Creek (32ME796) and Boeckel-Renner (32ME799) Sites, Mercer County, North Dakota. Department of Anthropology University of North Dakota for North Dakota State Water Commission, Bismarck, ND.

### Aaberg, S. A. and K. Deaver

1991 Testing and Evaluation of Nine Prehistoric Sites in Permit D Area, Coteau East Mine, Mercer County, North Dakota. Ethnoscience for the Coteau Properties Company, Bismarck, ND.

### Bergstrom, M. and K. Deaver

1988 Mitigation of Site 32ME163, Mercer County, North Dakota. Ethnoscience for Coteau Properties Company, Bismarck, ND.

### Boughton, J., J. Brownell and L. Peterson

1994a Coteau: A Cultural Resource Inventory of the North Mine Extension Area. Ethnoscience for the Coteau Properties Company, Beulah, ND.

### Boughton, J., S. Deaver, L. A. Peterson and J. Brownell

1994b [Draft] A Management Plan for Cultural Resources Identified Within the North Mine Extension Area. Ethnoscience for Coteau Properties Company, Bismarck, ND.

### Boughton, J., B. Fandrich, L. Litwinionek, L.A. Peterson and L. M. Peterson

2001 Coteau Properties Company: Testing and Criterion D Evaluation of Prehistoric Sites Located in Permit Extension Areas D and H and the West Permit Area, Mercer County, North Dakota. Ethnoscience for Coteau Properties Company, Bismarck, North Dakota.

### Boughton, J. and L. A. Peterson

1994 Testing and Evaluation of Prehistoric Sites within the North Mine Extension Area. Ethnoscience for Coteau Properties Company, Bismarck, ND.

### Boughton, J., K. VanderSteen, L. A. Peterson, L.M. Peterson and J. Lieb

1996 Data Recovery of 13 Located in the North Mine Extension Area, Mercer County, North Dakota.

Ethnoscience for Coteau Properties Company, Bismarck, ND.

### Deaver, K.

1985 Cultural Resource Management Plan for Coteau Freedom Mine (Life-of-Mine). Ethnoscience for Coteau Properties Company, Bismarck, ND.

### Deaver, K. and J. Brownell

1988 Site Mapping, Testing and Evaluation in Area F, Coteau Freedom Mine, Mercer County, North Dakota. Ethnoscience and Headwaters Cultural Research for Coteau Properties Company, Bismarck, ND.

1992 Cultural Resources Management Plan for the Coteau East Mine Area (Life-of-Mine Area). Ethnoscience and Headwaters Cultural Resources for Coteau Properties Company, Beulah, ND.

### Deaver, K., S. Deaver and M. Bergstrom

1989 Onion Ring, 32ME166, A Tipi Ring Site in Central North Dakota. Ethnoscience for the Coteau Properties Company, Bismarck, ND.

### Deaver, K. and K. Schweigert

1983 Archaeological and Historical Evaluation Project for Proposed Permit Area D Coteau Properties Freedom Mine Area 2, Mercer County, North Dakota. Ethnoscience for Coteau Properties Company, Bismarck, ND.

1988 Cultural Resource Management Plan for Coteau Freedom Mine (Life of Mine Area). Ethnoscience and Cultural Research and Management, Inc. for Coteau Properties Company, Bismarck, ND.

### Deaver, S.

2001 Traditional Cultural Qualities of Sites in the Proposed Coteau Mine Expansion Area (Permit Areas D, H and the West Permit Area). Report compiled by Ethnoscience with contributions by Ronald Sam Little Owl, George Ironshield, Tim Mentz, Sr., Floyd Youngman and Curley Youpee for the Coteau Properties Company, Beulah, ND.

### Dill, C. L.

1978 1977 Cultural Resources Inventory: Antelope Valley Station/A.N.G.C. Gasification Plant Site, Associated Mining Areas and Ancillary Facilities. State Historical Society of North Dakota, Bismarck, ND.

### Gregg, M. L., C. Kordecki, D. D. Kuehn and K. Vander Steen

1985 Southwest Pipeline Archaeology: Initial Survey

of Selected Tracts. Department of Anthropology, University of North Dakota, Grand Forks and Belfield, North Dakota, Contribution No.217. Report for North Dakota State Water Commission, Bismarck, ND.

**Haury, C., P. Picha, J. Artz & S. Ahler**

1988 Evaluation of Four Cultural Resources on the Southwest Pipeline. University of North Dakota, for the Bureau of Reclamation and State Water Commission, Bismarck, ND.

**Historical and Archaeological Surveys, Inc. (HASI)**

1981 Final Report, Historical and Archaeological Survey and Testing Project, Proposed Mining Area - The Coteau Properties Company, Antelope Valley, Mercer County, North Dakota. HASI for Coteau Properties Company, Bismarck, ND.

1982 Archaeological Test Excavation Project: Seven Previously Recorded Archaeological Sites, Permit C Mine Area, Mercer County, North Dakota. HASI for Coteau Properties Company, Bismarck, ND.

1983a Archaeological Testing Project: Site 32ME237 Mine Area C of Coteau Properties Company's Freedom Mine, Mercer County, North Dakota. HASI for Coteau Properties Company, Bismarck, ND.

1983b Cultural Resource Inventory of 760.8 Hectares (1,880 Acres) in the Coteau Properties Company's Mine Areas D and E, and Evaluation of Four Formerly Recorded Historic Sites in Mine Area D, Mercer County, North Dakota. Report compiled for the Coteau Properties Company, Beulah, ND.

**Kuehn, D. D., J. W. Hodny and K. P. Schweigert**

1984 National Register Evaluations of Twelve Archaeological Sites and Eight Historical Sites in the Coteau Mine Area D and J, Mercer County, North Dakota. UNDAR-West (Report #724) for Coteau Properties Company, Bismarck, ND.

**Larson, T. K. (editor)**

1992 The 1989 Archaeological Investigations at 32ME797, 32ME799 and 32ME847 Along the Southwest Pipeline Project, Mercer County, North Dakota. Larson-Tibesar Associates, Inc. for the North Dakota State Water Commission, Bismarck, ND.

**LaVardera, L. T.**

1984 Cultural Resources Survey of Mine Areas 1, 2 and 4. The Coteau Properties Company, Mercer

County, North Dakota, Vol. 1. Report for Coteau Properties Company, Bismarck, ND.

**Metcalf Archaeological Consultants, Inc. (MACI)**

1991 Dakota Star Reserve - 1991 A Class III Cultural Resource Inventory, Mercer County, North Dakota, Final Report, draft. Report for Coteau Properties Company, Beulah, ND.

**Persinger, R.E.**

1990 Dakota Star Reserve Cultural Resource Inventory. Mercer County, ND. Report for the Coteau Properties Company, Bismarck, ND.

**Peterson, L. A.**

2001 A Cultural Resource Management Plan for Permit Area Extension H, Mercer County, North Dakota. Report for Coteau Properties Company, Bismarck, ND.

**Peterson, L. A. and J. Brownell**

1989 Archaeological and Historical Investigations of Sites within the Coteau Freedom Mine Area (Life of Mine Area). UNDAR-West for the Coteau Properties Company, Bismarck, ND.

**Peterson, L. A. J. Boughton, S. Deaver and L. Litwinionek**

2000 Cultural Resource Testing and Evaluation Plan For Permit Extension Areas D and H and the West Permit Area, The Coteau Mine, Beulah, North Dakota Ethnoscience for Coteau Properties Co., Bismarck, ND.

**Peterson, L. A. and J. Boughton**

1997 Proposal for Data Recovery at 32ME254, Mercer County, North Dakota. Ethnoscience for Coteau Properties Co., Bismarck, ND.

**Peterson, L. M.**

1996 Additional Testing at Six Prehistoric Sites Located within the North Mine Extension Area. Ethnoscience for Coteau Properties Company, Bismarck, ND.

**Peterson, L. M. and L. A. Peterson (editors)**

1995 The Bees Nest Site, Mitigation of a Multi-Component Stone Ring Site in Central North Dakota (Vols. I & II). Ethnoscience for Coteau Properties Co., Bismarck, ND.

**Schweigert, K. P.**

1983 Historical and Architectural Survey and Evaluation of Eleven Sites, Coteau Properties Mine Area 2, Proposed Permit "D" Area, Mercer County, North Dakota. Cultural Research and Management, Inc. under subcontract with Eth-

noscience for the Coteau Properties Company, Bismarck, ND.

1985 A Cultural Resource Survey of an Abandoned Mine Tipple Near Hazen, ND. Cultural Research and Management, Inc. for the Coteau Properties Company, Bismarck, ND.

**Spath, C.**

- 1991a The Bees Nest Ring Site (32ME175): Inventory of 80 Acres T145N R88W, Section 2, Mercer County and Documentation and Limited Testing of 32ME175. Metcalf Archaeological Consultants for Coteau Properties Company, Bismarck, ND.
- 1991b Report on Tasks I and IV: Inventory of 80 Acres and Documentation and Evaluation of 32ME175. Cultural Resource Management for the Coteau Properties Company, Bismarck, ND.

**Spath, C., N. Ross and R. C. Christensen**

- 1991a 32ME254, Evaluation and Intensive Testing. Metcalf Archaeological Consultants, Inc., for Coteau Properties Co., Bismarck, ND.
- 1991b Dakota Star Reserve Cultural Resource Inventory, Mercer County, North Dakota. Vols. I-XI. Metcalf Archaeological Consultants, Inc. for the Coteau Properties Company, Beulah, ND.

**Spath, C. and K. Schweigert**

- 1991 A Cultural Resources Management Plan for Prehistoric and Historic Period Cultural Resources in Dakota Star Reserves Life of Mine Area. Cultural Research Management for Basin Cooperative Services, Bismarck, ND.

**Strait, J. D., B. Fandrich and O. Koenig**

- 2002 A Class III Cultural Resource Inventory of the Coteau Properties Company's Mine Area 2 North, Mercer County, ND. Ethnoscience for Coteau Properties Company.

**Walker-Kuntz, S. A. and J. M. Boughton**

- 1999 Data Recovery at 32ME797 and 32ME1456 Mercer County, North Dakota. Ethnoscience for Coteau Properties Co., Bismarck, ND.

**Walker-Kuntz, S. A., J. M. Boughton and B. Fandrich**

- 1998 Survey and Testing of Portions of Sections 26 and 35, T146N R88W within the North Mine Extension Area, Mercer County, North Dakota. Ethnoscience for Coteau Properties Co., Bismarck, ND.

**Winzler, S., J. Boughton and L. M. Peterson**

- 1998 Data Recovery at 32ME254, Mercer County, North Dakota. Revised June 1998. Ethnoscience for Coteau Properties Co., Bismarck, ND.

**Woolworth Research Associates (WRA)**

- 1974 A Final Report on an Archaeological, Historical Assessment Program for the North Dakota Coal Gasification Project in Mercer County, North Dakota. WRA for North American Coal Company, Bismarck, ND. Manuscript on file with the State Historical Society of North Dakota, Bismarck, ND.

## APPENDIX B

### OWNERSHIP OF LANDS WITHIN THE WEST MINE AREA

#### FEDERAL MINERAL ESTATE

<i>Description</i>	<i>Acres</i>
T. 144 N., R. 88 W.	
Section 2	164.18
Section 4	483.83
Section 6	647.41
Section 8	360.00
T. 144 N., R. 89 W.	
Section 12	320.00
T. 145 N., R., 88 W	
Section 4	555.92
Section 10	320.00
Section 14	640.00
Section 22	640.00
Section 26	480.00
Section 28	480.00
Section 34	480.00
Total Federal	5,571.34

#### NON-FEDERAL ESTATES

Private Surface	16,251
Private Minerals	10,200
State Surface	800
State Minerals	1,280
Total Acreage	17,051



## APPENDIX C

### PREHISTORIC CONTEXT

#### (DERIVED FROM PETERSON 2003)

#### Temporal /Cultural Framework

##### Paleoindian Tradition

The earliest occupations in North Dakota are associated with the Paleoindian tradition; a time associated with the retreat of the glacial ice masses. This tradition is believed to have occurred from 12,000 to 7,500 years ago (SHSND-AHP 1990). Culturally, the tradition is characterized by a series of related technological complexes distinguished by the use of high quality cryptocrystalline raw materials for the production of sophisticated tool kits geared toward the exploitation of large game. Low population density and high residential mobility are other hallmarks of the Paleoindian tradition.

Paleoindian sites are extremely rare in North Dakota. In the Knife River study unit, extensive investigations have been conducted at Lake Ilo that exhibited a number of Folsom components. No intact Paleoindian components have yet been identified in the Coteau Mining Region.

##### Archaic Tradition

Compared to the preceding Paleoindian tradition, far more information is known about Archaic occupations in the Coteau Mining Region. The Archaic tradition occurred from 7,500 BP to roughly 2,400 BP (SHSND-AHP 1990). A general climatic warming trend, known as the Altithermal, was ushered in during this tradition. As a result of the warming trend, increased periods of drought occurred, leading to the demise of numerous animal resources utilized during the previous Paleoindian tradition. The Middle and Late Archaic witnessed alternating episodes of normal dry and wet conditions, though all were less severe than during the preceding Altithermal.

Three medium to large unnotched, parallel obliquely flaked bifaces were found below Ring 143 at the Bees Nest site (32ME175) [Peterson and Peterson 1995]. Two nearby hearth/roasting pits suggest these artifacts are associated with an occupation that occurred 5,350 years ago. The pits are interesting, not only because they are some of the oldest features in the Coteau Mining Region, but also because no other features like these have been found. They are relatively large (2 ft diameter by 1.5 ft deep) and contain fire-cracked rock and exhibit oxidation along their edges. They are somewhat reminiscent of early plant processing features found at sites in the Great Basin, though uncommon on the

glaciated northern plains. A pollen analysis of the fill did not provide information regarding their purpose.

Another Early Archaic component was identified at 32ME254 by the presence of Oxbow projectile points (Winzler et al. 1998). This was the earliest dated component identified at the site and was represented by Oxbow projectile points found beneath Ring 87. Two other Oxbow points (in addition to McKean and Besant projectile points) also were recovered below Ring 79; suggesting 32ME254 was occupied multiple times. No dateable features or bone were found in association with these projectiles. Dates for the occurrence of Oxbow in North Dakota range between 5300-4500 BP; however, the North Dakota State Plan (SHSND-AHP 1990) suggests that Oxbow style projectiles may be more recent in age. To explore this possibility, the North Dakota State Plan places an emphasis upon identifying intact Oxbow deposits that can be dated later than 4500 BP (SHSND-AHP 1990:3.30)

An Oxbow-style point was identified at 32ME185 (Boughton et al. 1999) in the West Mine Area. The site is situated within a plowed field, however, a small number of artifacts were observed below the plow zone, suggesting more intact deposits might exist.

##### Middle Archaic

Unlike the isolated examples of early Archaic occupations, Middle Archaic occupations are relatively common. Middle Archaic components are often represented by McKean, Duncan or Hanna projectile points. Their occurrence in North Dakota date from 4500-3000 BP (SHSND-AHP 1990).

The earliest use of the tipi representing upland plains living is believed to have occurred during the middle Archaic and likely during the McKean complex (Frison 1978:51; Reeves 1970). It is, therefore, not surprising that we find McKean complex projectiles in stone ring features. Indeed, McKean components have been identified at almost all of the larger ring sites that have been investigated in the Coteau Mining Region. These include the Onion Ring site (32ME166) [Deaver et al. 1989], the Bees Nest site (32ME254) [Peterson and Peterson 1995] and site 32ME254 (Winzler et al. 1998). At the Onion Ring site, a single Duncan point was recovered from a cairn feature; little was learned about this occupation at the site other than it appears to predate all the ring occupations. Two Hanna type points were recovered from the excavations at Ring 15-West at the Bees Nest site, indi-

cating the ring was occupied during this complex. At 32ME254, two McKean points and one Duncan point were recovered from Feature 64, a McKean point was recovered from Feature 79, and a Hanna-like point was recovered from Feature 57. Testing recovered McKean complex projectiles from five sites in the West Mine Area. Three were recovered from cairns (Feature 3C at 32ME144, Feature 1C at 32ME206 and Feature 9C at 32ME1589) and two from lithic scatters (32ME1508 and 32ME1548). Both of the lithic scatters are found within plowed fields.

## Late Archaic

Surprisingly, Pelican Lake projectile points are relatively rare in the Coteau Mining Region. Although they occur, they are present in very small numbers and are usually found mixed with Besant projectiles. Variation associated with different projectile point styles has traditionally been viewed as being temporally significant or diagnostic. However, a review of Besant sites in Montana and the Dakotas suggests some of the variation may be related to other factors, such as projectile recycling, especially retooling (S. Deaver 1997). Pelican Lake components representing the Late Archaic tradition in the Coteau Mining Region were identified at the Bees Nest site and site 32ME254. At the Bees Nest site, this projectile point style was identified at Ring 5. At 32ME254, a single possible Pelican Lake point came from Feature 57. Pelican Lake components are believed to date between 3500 and 1700 BP (Gregg 1985). The only Pelican Lake projectiles found within the West Mine Area are from sites 32ME185 and 32ME1548. Both sites have been repeatedly plowed and contain diagnostics other than Pelican Lake.

## Plains Woodland/Late Prehistoric Tradition

The Plains Woodland tradition is characterized by the appearance of pottery in the archaeological record and burial mound construction. An increase in the specialization of upland living and the utilization of open prairie resources continued from the preceding period. Toward the end of this tradition, the bow and arrow replaced the atlatl, dart and spear as the preferred weapon, which resulted in a more efficient exploitation of game. The presence of pottery in Woodland sites has led to many debates concerning the significance of Eastern Plains influences on Northwestern Plains peoples.

## Besant-Sonota

The majority of features previously examined in the Coteau Mining Region are associated with the Besant complex of the Plains Woodland tradition/Late Prehistoric period (Deaver and Brownell 1992). Previously, Besant has been reported to occur from 2000-1100 BP on the Northern Plains (Gregg 1985:118). Deaver and Deaver (1987:29) argue that

the Besant complex continued for a greater period of time in North Dakota, with transitional levels containing both Pelican Lake and Besant beginning around 2,300 years ago and continuing until 800 years ago. Investigations at the Bees Nest site (Peterson and Peterson 1995) pushes the onset of Besant in the Coteau Mining Region even earlier, with four radiocarbon dates associated with Besant projectiles that have an intercept date of circa 3,000 years ago (see Table 2.1). The Besant complex also appears to last longer in central North Dakota than in many regions of the plains. This finding presents the intriguing possibility that central North Dakota may have been the home territory for Besant populations. This finding also is supported by the dominance of Knife River flint within most Besant archaeological components dating to these times (Gregg 1985).

At the Onion Ring site, four ring features and one cairn are associated with this complex. Besant projectile points were recovered from three of the rings, while a hearth dating to approximately 1950 BP and two Besant fragments were identified in the fourth (Deaver et al. 1989). Two ring features at 32ME220 yielded Besant projectile points (Deaver 1990). A number of rings, including 10-West, 14-West, 37, 52, 53, 54 and 56 at the Bees Nest site have been interpreted to be Besant occupations based on the recovery of this type of projectile point and associated radiocarbon dates (Peterson and Peterson 1995). Of the eight ring features excavated at 32ME254, seven are believed to be associated with this complex (Winzler et al. 1998).

In the West Mine Area, 32ME185 (lithic scatter), 32ME1474 (cairn feature F5C), 32ME1544 (CMS), 32ME1548 (plowed field), 32ME1562 (Feature 25R), 32ME1577 (Feature 23R) and 32ME1580 (Feature 1R) contain Besant-style projectiles. Cord marked and smoothed-over-cord-marked pottery shards that typically mark middle/late Woodland occupations were identified at 32ME232 (Feature 33C), 32ME1323 (Feature 11R), 32ME1513 (Feature 26C) and 32ME1577 (Feature 3R).

Most Besant components are identified by co-occurring Besant-style projectile points. The range of variation observed within Besant projectiles is quite wide. Although a number of archaeologists (Deaver 1997; Hughes 1987) suggest that this is the result of curative tool maintenance associated with hunting and butchering, and that the variation also could reflect subtle stylistic changes in Besant projectile technology through time. If this is true, a greater refinement of the Besant occupations and changes through time can be obtained.

The primary interest of the North Dakota State Plan for the Knife River Study Unit (SHSND-AHP 1990) is in the Sonota complex and how it may relate or be distinguished from the later Plains Village tradition. The Sonota complex is distinguished by the development of burial mound ceremonialism. Sonota sites and Besant sites are virtually indistinguish-

able, except for the presence of burial mounds (Neuman 1975). Sonota is believed to represent a more sedentary adaptation associated with a more “Woodland” lifestyle near river valleys: Besant groups generally lived in upland tipi camps and practiced a mobile, bison hunting adaptation. The presence of mound features at the Boeckel-Renner site (32ME799), in what appears to be an upland Besant stone ring site, could suggest Sonota may not have been as restricted to the river valleys as was once believed. The Boeckel-Renner site is immediately adjacent to the West Mine Area (Artz 1989). In a more generic sense, the North Dakota State Plan (SHSND-AHP 1990) is interested in whether the Woodland tradition co-existed with the Plains Village tradition.

## Mortlach

One site, 32ME1578, contains Mortlach pottery. The presence of a Mortlach component in the West Mine Area is noteworthy since other Mortlach sites have not been identified in the Coteau Mining Region. Because Mortlach is not commonly found south of the Missouri River, Dr. Walde, a ceramic specialist at the University of Calgary, came to the Ethnoscience facilities to confirm their cultural affiliation. Mortlach ceramics have been attributed to the Hidatsa (Byrne 1973; Malainey 1991; Wetlaufer and Mayer-Oaks 1960) or to the Gros Ventre (Joyes 1973; Kehoe and Kehoe 1968). However, more recently a strong case has been made for an affiliation between Mortlach ceramics and the Assiniboines (Walde 1994).

## Avonlea

Although the Avonlea complex is generally regarded as a western manifestation, we have some evidence of this complex in the Coteau Mining Region. Avonlea projectiles are notable because they are believed to be the first evidence for the bow and arrow in the Northern Plains. Avonlea occurrence in North Dakota is believed to range from 1,500 to 1,000 years ago (SHSND-AHP 1990). It is not generally believed to have obtained a foothold in central North Dakota. The only evidence for Avonlea in the Coteau Mining region occurs within one ring feature at the Bees Nest site (Peterson and Peterson 1995) and a cairn at 32ME1374 (Boughton and Peterson 1994).

Thirty-four point or point fragments recovered from the Northeast portion of Feature 18 represented the Avonlea projectile points at Bees Nest. This area of the ring was identified to be a re-tooling locality. In the southwest portion of the ring, evidence exists for the manufacture of projectile points. The unusual aspect of this knapping station was the presence of Besant projectiles that are believed to have been discarded during manufacture. It is suggested that the Avonlea projectile points were removed and replaced with Besant projectiles that were made within the inhabited tipi.

Therefore, the presence of Avonlea projectiles at this location may actually be associated with a Besant component.

## Plains Village Tradition

The most recent prehistoric occupations identified in the Coteau Mining Region tend to be associated with Plains Village occupations. The components are often identified by the presence of small side-notched projectiles points, such as Plains side-notch and Prairie side-notch points, ceramics, or earthlodge features.

The Plains Village tradition began around 1,000 years ago and continued until roughly 250 years ago (SHSND-AHP 1990). The period of time associated with the Plains Village tradition is represented at a number of sites in the Coteau Mining Region. Previously investigated sites include Cairn 4 at the Onion Ring site (Deaver et al. 1989), Features 34, 35, 134 and the later occupation identified at the Zone C block excavations at the Bees Nest site (Peterson and Peterson 1995) and Ring 10 at 32ME1403 (Boughton et al. 1996) have been identified as being occupied or used during the Plains Village tradition. In the West Mine Area, 11 sites contain possible Plains Village components. The sites include 32ME205, 32ME232 (Feature 33C), 32ME756 (Feature 16R), 32ME766, 32ME1478 (Feature 5C), 32ME1513 (Feature 1C, Feature 23R), 332ME1524 (Feature 5C), 332ME1548, 32ME1551 (Feature 6D), 32ME1561 (Feature 5R), 32ME1577 (Feature 3, Feature 23R) and 32ME1589 (Feature 9C).

In the West Mine Area, 24 sites yielded diagnostic artifacts. Of these 12 (50%) are attributable to Plains Village. In fact, it is the most commonly represented component in the West Mine Area. This is different than the sites examined east of the Beulah trench, which are dominated by Besant components. Why this should occur is unknown.

## Equestrian Nomadic Tradition

With the onset of exploration in the Americas, Euro-American populations introduced a variety of goods that were readily adopted by the Plains tribes. The horse and the gun were of particular importance. Unfortunately, communicable diseases were also introduced. The availability of new technologies and disease is believed to have had increasingly severe impacts to the lifestyles of regional tribal populations. Ethnographic accounts suggest the new permit area was extensively exploited; however, little evidence has been found archaeologically. In part, this can be attributed to the short time span (1720-1820s) associated with this tradition.

Currently, the only site that contains evidence of tribal occupations in the region after the introduction of Euro-Americans to North America is at the Bees Nest site. Two cairns and a series of alignments that are associated with the burial

of Raven Chief during the occupation of the Like-A-Fishhook Village represent this period. This site has been identified as a Traditional Cultural Property under Criterion B, because of its association with an important leader of the Hidatsas (Peterson and Peterson 1995).

The proximity of the new permit area to Like-A-Fishhook Village and the presence of a burial at the Bees Nest site suggest the new permit area was occupied during the Protohistoric and Historic periods. No sites associated with the Equestrian Nomadic are identified in the West Mine Area.

## Multiple Components

Many of the sites investigated in the Coteau Mining Region exhibit multiple components indicative of repeated occupation. McKean, Plains Village, and Oxbow diagnostics are often found in sites that are dominated by Besant occupations. While diagnostics found in individual stone ring features often are easily separated, separating components within the same stone ring feature is more complicated. This is made especially difficult because of the shallow nature of cultural deposits present in glacial till sediments.

The occurrence of earlier diagnostic artifacts found beneath the ring wall depth has been used to identify separate components at some stone ring features (Peterson and Peterson 1995; Winzler et al. 1998); however, separating the non-diagnostic artifacts (e.g., flaking debris bone) is often problematic. In cases where diagnostics from different components at or above the base of the stone ring wall occurs, it is generally assumed that the later component is associated with the use of the stone ring (Peterson and Peterson 1995; Boughton et al. 1996; Peterson and Peterson 1995; Winzler et al. 1998). Features 1 and 2 at 32ME169, which represents a stone ring feature placed within another stone ring feature, provide an excellent opportunity to determine whether a more fine-grained excavation technique (i.e. excavation in 5 cm levels) is a method of distinguishing between successive occupations.

## AMERICAN INDIAN HISTORY (FROM BOUGHTON 1999)

Direct association between prehistoric cultural complexes and known modern Indian populations remains difficult to clearly define. In large part, this shortcoming is due to the fact that investigations of prehistoric sites are largely based upon material culture, while data used to time the movements of the ancestors of modern tribal groups are based on linguistic affiliation.

The earliest sites for which a linguistic affiliation has been ascribed in North Dakota are Plains Village sites. Plains

Villagers are ancestral to both the Mandan and Hidatsa (Gregg and Hanson 1983:54-55). One of the earliest sites for which linguistic affiliation has been ascribed is the Flaming Arrow site, which is located on the Missouri River 20 miles below the Knife and Menoken Village on Apple Creek, east of Bismarck (Ahler et al. 1991). Ahler and others (1991:27-30) suggest this habitation site represents an occupation by ancestral Awatixa (Hidatsa also referred to as Minnetaree) around AD 1100. It is also speculated that early Mandan populations may have also been present in the Missouri area at this time (Ahler et al. 1991:29; Glassner 1974a:72-73).

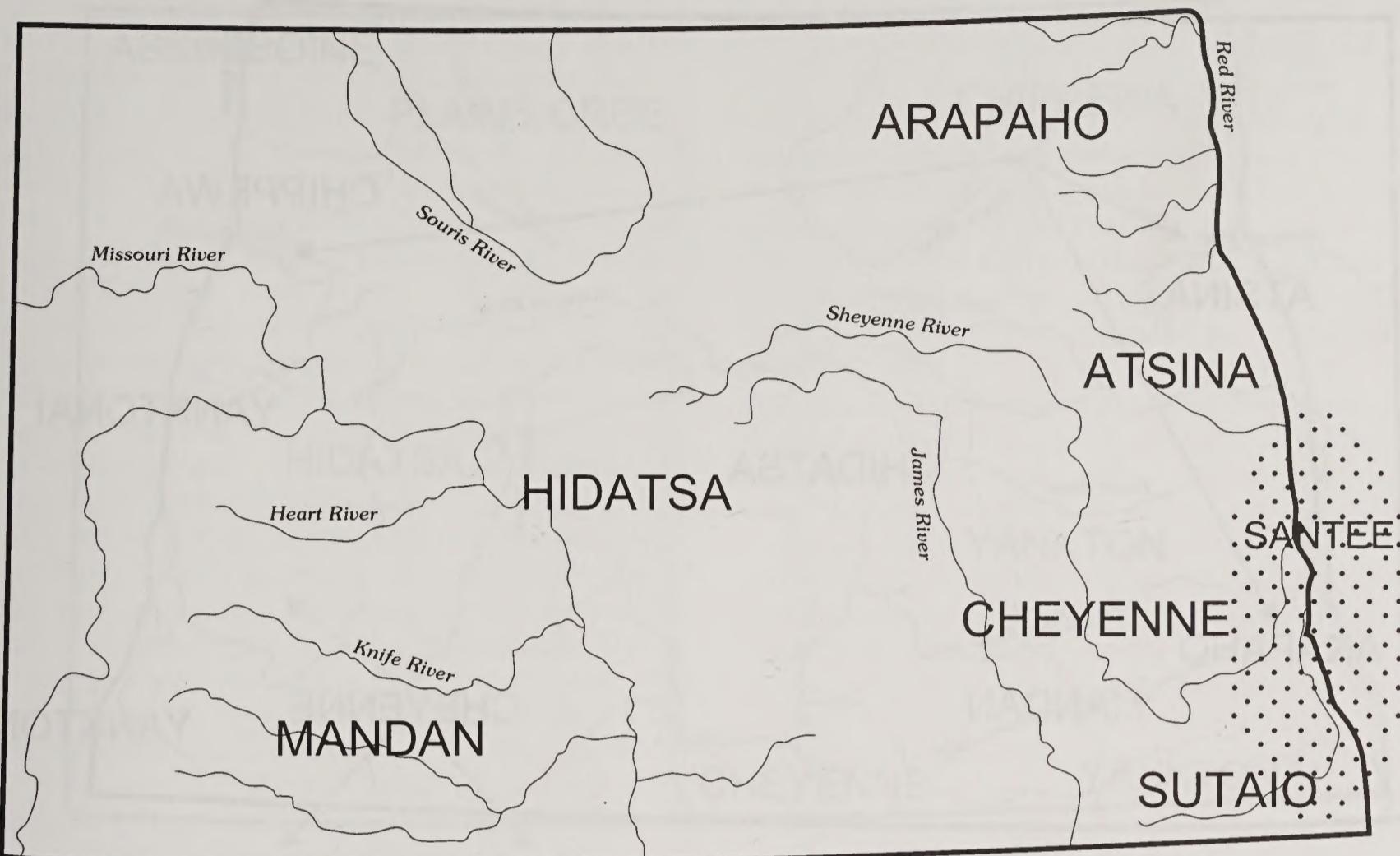
Between AD 1200 and 1450, both ancestral Awatixa and Mandan populations became firmly established in the Knife River region (Ahler et al. 1991:31). Around AD 1400, early Mandan began occupying the area south of Square Butte, while the ancestral Awatixa inhabited much of the Missouri up-stream of Square Butte and into eastern Montana, including the Devils Lake area. Populations of both groups are believed to have increased dramatically during this period of time (Ahler et al. 1991:38-39). By the mid 1400s, a few large villages were inhabited below the Knife River, consisting mostly of a few lodges scattered along the terraces adjacent to the river bottoms (Ahler et al. 1991:52). Between AD 1475 and 1525, the community structure began to change. Villages became reduced in number, larger, more densely packed, and eventually fortified (Ahler et al. 1991; Glassner 1974a, 1974b). Archaeological evidence suggests that between AD 1450 and 1600, ancestral Mandan and Awatixa heavily interacted with one another and exchanged many material traits (Ahler et al. 1991:45).

Meanwhile, the Red River valley of the north was occupied by the Cheyenne-Sutaio and Arapaho-Atsina, with the Cheyenne-Sutaio to the south and the Arapaho-Atsina to the north (Hewes 1961:51). Proto-Blackfoot may have also been located in Minnesota or in the Red River valley (c.f., Hewes 1961:54).

## AD 1600-1700

Between AD 1600 and 1700, oral traditions, marking specific tribal movements and early written documents, provide a clearer understanding of the movement of populations within North Dakota (Figure C.1). However, increased tribal movements also characterize this period. Under pressure from the northward encroaching Arikara, the Mandan moved out of South Dakota and settled between the Cannonball River and Knife River (Hewes 1961:54). Two waves of Hidatsa moved into the Middle Missouri region. The first was the Awaxawis, who became closely allied with the Mandan. The second wave was the Hidatsa-proper (Minnetarees) (S. Deaver 1986; Voget 1984!). As a population, the Hidatsa continued to control the region during this period. Around 1670, a quarrel between No Vitals (leader

**Figure C.1**  
**North Dakota ca. AD 1600**



of the River Crow) and other Hidatsa occurred at Devils Lake, which eventually lead to a split between the two groups (Voget 1984:4-9).

The Sioux, escaping hostile Chippewa and seeking the abundance of bison on the plains, began pushing westward in the late 1600s from the woodlands of Minnesota. As they moved west, they began to encroach on the territory occupied by the Cheyenne-Sutaio and Arapaho-Atsina in the Red River valley. In response, the Arapaho-Atsina began moving west.

The Assiniboine split from Yanktonai Sioux around 1640 to 1650, starting moving northwesterly and became aligned with the Cree (S. Deaver 1986:24; Hewes 1961:51). The Assiniboine traded corn received from the Mandan and other village tribes of the Missouri, for axes, knives, bullets, and gunpowder from the French and English traders (Rodnick 1938:1).

## AD 1700-1780

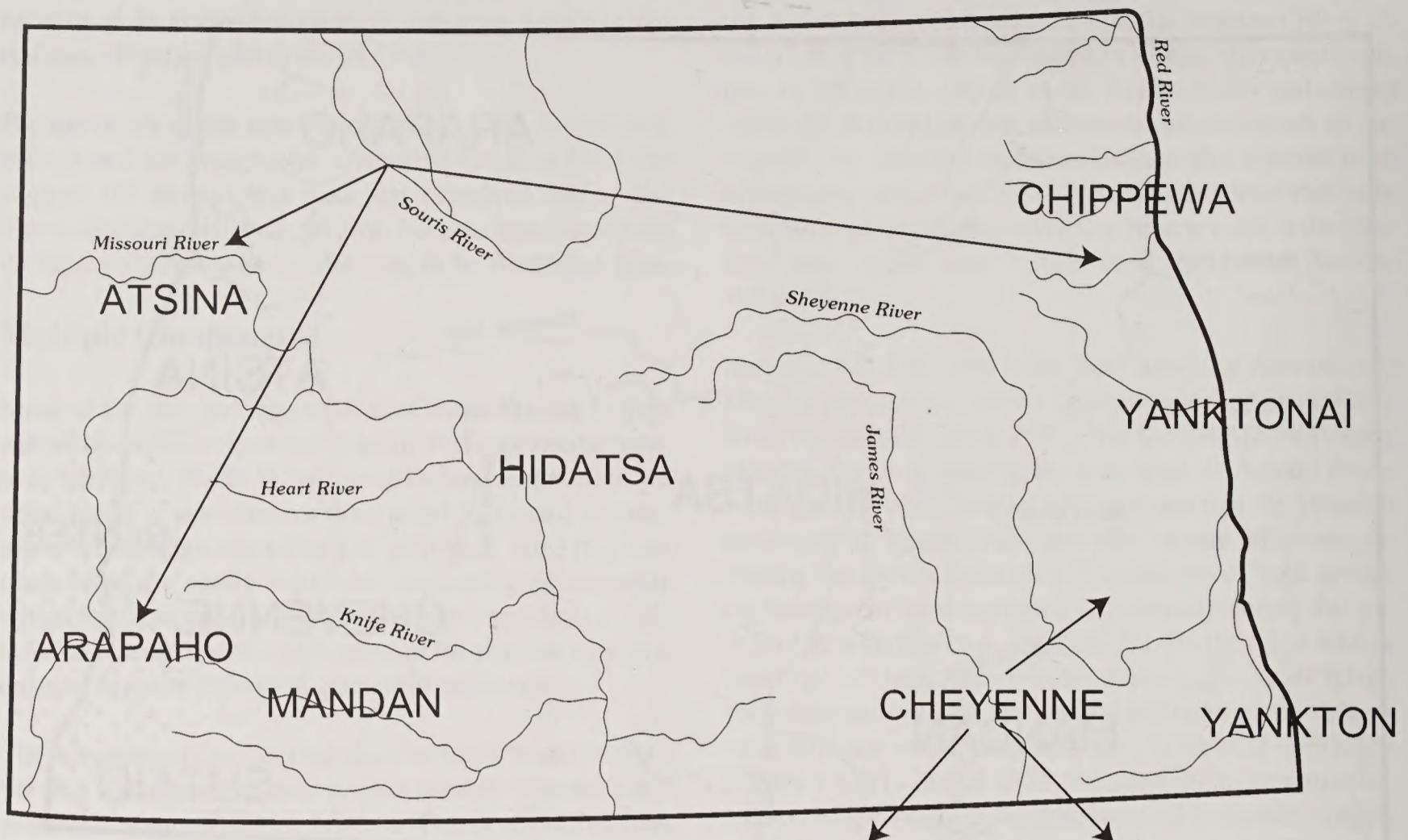
Between 1700 and 1780, an increasing number of Indian groups moved into North Dakota (Figure C.2). As contact increased, mobility increased and territories became more

fluid. During this period of time, ancestral River Crow moved along the Yellowstone in Montana (Voget 1984). The Mandan and remaining Hidatsa occupied villages near the Heart River of North Dakota, but their hunting territory extended far outside the trench. The range of the Hidatsa-proper bands at this point included the Missouri, lower Yellowstone, Little Missouri and Souris rivers, as well as the Turtle Mountains and Devils Lake region (Bowers 1965:26). Hidatsa villages occurred along the northern edge of the Turtle Mountains and on Graham's Island in Devil's Lake (Gregg et al. 1983:56).

The Arapaho and Atsina expanded westward from the Devil's Lake area across the Coteau to the area around the mouth of the Little Missouri River. In the 1720s, the Arapaho and Atsina separated (Hewes 1961:52). The Atsina moved in a northwesterly direction and by 1750 became allied with the Blackfoot. The Arapaho moved in a southwesterly direction and became allied with the Cheyenne.

The Assiniboine and their allies, the Plains Cree, hunted in the valley of the Souris River in the winter and near the Turtle Mountains in the summer. Some bands of the Hidatsa-proper and some Plains Chippewa also utilized this area. The Sioux blocked all groups from crossing the Missouri Coteau.

**Figure C.2**  
North Dakota ca. AD 1700



By 1738, the Chippewa pushed across the Red River valley and began moving toward the Turtle Mountains (Gregg et al. 1983:40-41). Major divisions within the Cheyenne occurred during this time. The majority of the Cheyenne had moved south from the Red River valley; however, some went to the Sheyenne River in North Dakota.

The Yankton controlled eastern South Dakota in 1720. By 1740, Yanktonai territory centered in southern North Dakota, east of the Missouri River. Yanktonai earthlodge villages (Drifting Goose, Big Head, and Little Soldier) were settled; however, only five percent of the Yanktonai lived in the villages at any point in time (Gregg et al. 1983:41).

#### AD 1780-1850

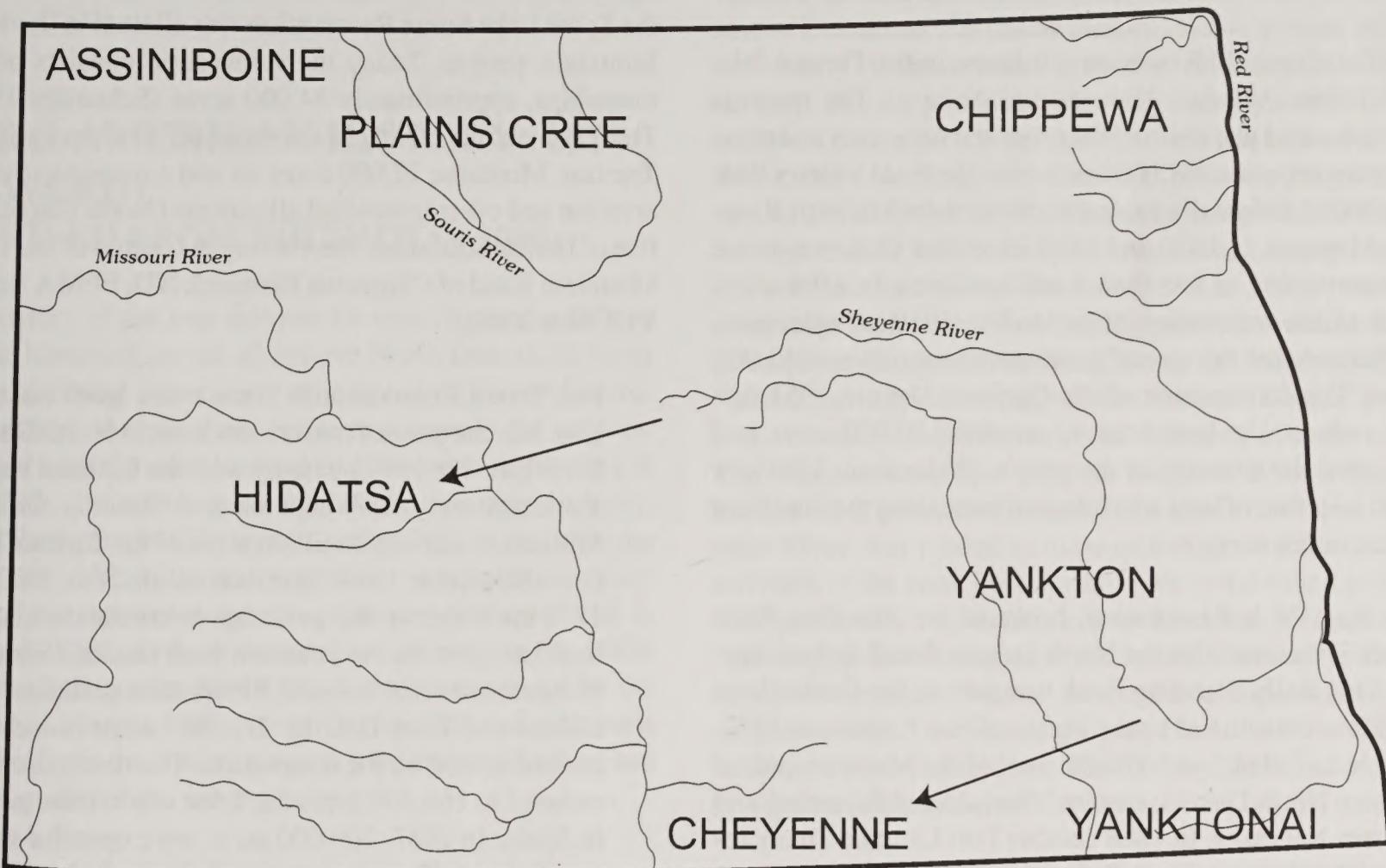
This period is marked by increasing hostility between Indians. The encroachment by white populations further increased the tensions. In the late 1700s, the Mandan, Hidatsa and Arikara still held traditional territories along the Missouri in the Dakotas (Figure C.3). Smallpox swept through these populations in 1780 to 1781. The Arikara were decimated and the Mandans lost two-thirds of their population. The Hidatsa, however, fared somewhat better (Ahler et al. 1991:57). Disease and continued harassment by the Sioux forced most of the Mandan to abandon their traditional territory around the Heart River and to move north to join the Hidatsa around the Knife River.

Hidatsa-Mandan villages were formed in the 1790s. The Hidatsa-proper moved into temporary camps near the Mandan in the Heart River area and then moved upstream

North of the Knife River with the agreement of the Mandan and other Hidatsa (Gregg et al. 1983:56). The Arikara abandoned their villages in South Dakota and moved upriver to join other Arikara at Greenshield (32OL17). They stayed only briefly due to conflict with Mandan and Hidatsa, and then moved back downriver and formed three villages near Mobridge, South Dakota. Consolidation of the three tribes continued through the 1800s, forced by continuing Sioux raids and population losses caused by more smallpox epidemics (e.g., 1837). In 1837 to 1838, the Arikara moved into the former Mandan village at Fort Clark (32ME2). By 1845, the Mandans and Hidatsa ceased to exist as independent tribal units. Together they formed a new settlement, Like-A-Fishhook Village. By 1862, all of the remaining Mandans and the Arikara had joined this community (Ahler et al. 1991; S. Deaver 1986).

Beisterfeldt, the Cheyenne earthlodge village on the Sheyenne River, was destroyed by invading Chippewas ca. 1790. Consequently, some groups of Cheyenne moved to the vicinity of Fort Yates. The Sutaio were absorbed into the Cheyenne. The combined Cheyenne-Sutaio then split into two groups, the Northern and Southern Cheyenne (Wood and Liberty 1980:286).

**Figure C.3**  
**North Dakota ca. AD 1780**



In the 1800s, the Plains-Cree and Assiniboine hunted in the valley of the Souris River in the winter and near the Turtle Mountains in the summer. However, they could not cross the Coteau as it continued to be blocked by hostile Sioux (Ewers 1974:35). The Assiniboine held the confluence of the Missouri and the Yellowstone (Hewes 1961:52). The Chippewa-Cree crossed the eastern boundary of North Dakota (Ewers 1974:35) and continued moving westward, spreading to central Montana by 1850. Northern North Dakota was controlled by the Chippewa-Cree and southern North Dakota was dominated by the Yankton.

## INDIAN RESERVATIONS

Before 1850 lands in the West including North Dakota were set-aside as Indian Country for the Plains and removed eastern tribes. Migration and immigration of white settlers and inherent problems lead to the Treaties of Fort Laramie of 1868 and the Treaty of Medicine Lodge of 1867, which established large reservations for the tribes. The Great Sioux Nation after the Plains conflicts of the 1860-1870s was divided into smaller reservations in North and South Dakota. After 1871 Congress made no more treaties with American Indians. Congress passed the General Allotment Act in 1887 providing for the allotment of lands to individual Indians. The immediate effect of the act was to again reduce the size

of Indian reservations as lands were sold off. The Indian Reorganization Act of 1934 was passed to halt the sale of tribal lands, ending the allotment policy. The Act also allowed the tribes to incorporate and establish tribal constitutions and constitutional forms of government.

Forced assimilation by relocation marked the Federal policy of the 1950s. The government provided financial assistance to relocate in urban areas. House Concurrent Resolution 108 was to terminate "from Federal supervision and control and from all disabilities and limitations applicable to Indians". One of the tribes was the Turtle Mountain Chippewa. Under Termination policy all the trust lands would be sold and proceeds divided among the people. No reservation and no further governmental services would be provided. At the end of the 1960s the policy of Termination was changed to the comprehensive policy of Self-Determination.

In 1975 the Indian Self-Determination and Education Assistance Act formally changed the policy of termination. The act among other changes provided that tribal governments could contract with the Bureau of Indian Affairs to administer their own programs. Today tribes constantly face lack of sufficient funds to support their programs and are faced with Federal-funding cuts.

There are four Indian reservations within North Dakota: Fort Berthold, Standing Rock, Fort Totten, and Turtle Mountain.

The Sisseton Reservation, which extends into North Dakota, has its administrative center in South Dakota and is considered a South Dakota reservation (Schneider 1994).

The Fort Berthold Reservation is home to the Three Affiliated Tribes (Mandan, Hidatsa, and Arikara). The reservation is located just north of the proposed mine area and presently covers some 981,000 acres (Fort Berthold Library Web Site 2003). Originally extending west of the Missouri River into Montana. In 1870 and 1880 Executive Orders reduced the reservation to less than 3 million acres. In 1894 allotment of the reservation began and in 1910 an agreement further reduced the size of the reservation to some 643,000 acres. The construction of the Garrison Dam in 1954 further reduced the land base by another 150,000 acres and disrupted the lifeways of the people (Ahler et al. 1991). In 1970 a section of land was returned increasing the land base to its current acres.

Standing Rock Reservation, home of the Standing Rock Sioux Tribe straddles the North Dakota-South Dakota border. Originally Standing Rock was part of the Great Sioux Nation as established by the Treaty of Fort Laramie in 1851. It included all of South Dakota west of the Missouri, part of western North Dakota, eastern Montana and Wyoming and western Nebraska. In 1868 another Fort Laramie Treaty reduced the Nation to South Dakota west of the Missouri River. From 1882 to 1889 a series of treaties were made with individual Sioux tribes and bands. The Act of 1889 provided for over two million acres for the Standing Rock Reservation. Most of the reservations inhabitants were members of the Hunkpapa band although descendants of the Oglala, Yanktonai, Blackfoot Sioux, and others lived there (Schneider 1994; American Indian Relief Council 2003 web site). In 1906 allotments began and in 1908 a million acres in the western part of the reservation were opened to white settlers. In 1948 the reservation contained over one million acres of land. The Oahe Reservoir took 50,000 acres of bottomland. In 1973 the reservation holdings had shrunk to 844,000 acres.

Turtle Mountain Reservation is home of the Turtle Mountain Band of Chippewa. Located just below the Canadian border, the reservation was the last to be established in North Dakota. The establishment of the Dakota Territory recognized the claims of Chippewa and Metis to 10 million acres in northeastern North Dakota. The Metis are recognized as a distinct ethnic group and their affiliation with the Chippewa has permitted them to be classified as Indians. Although the government originally agreed to this claim, in 1882 the land was opened to settlement. Also in 1882 an Executive Order set aside a tract of land of 72,000 acres for the use of the Turtle Mountain Chippewa. In 1884 the land base was reduced to two townships. The sum of 1 million dollars was paid for reparations of lands opened to settlement (Gourneau 1993). About this time Metis from Canada fled from the Riel Rebellion and those who could establish claim to tribal

ancestry would be able to settle on the reservation. The reservation was too small to contain all that wanted to settle. Many had to settle far from the reservation. In 1906 part of the Spirit Lake Sioux Reservation was allotted to the Turtle Mountain people. Today the reservation consists of two townships, approximately 34,000 acres (Schneider 1994). The Tribe and its members also hold 6,700 acres in trust at Trenton, Montana; 72,000 acres on and adjacent to the reservation and other individual allotments (North Dakota Office of Indian Education The History & Culture of the Turtle Mountain Band of Chippewa Bismarck ND; FEMA Region VIII Web 2003):

Fort Totten Reservation is home to the Spirit Lake Nation. It is the eastern most reservation in North Dakota. Established in 1867 by treaty with the Cuthead band of Yanktonai and the Wahpeton and Sisseton Sioux of Minnesota was eight million acres of the Dakota Territory (Schneider 1994; spiritlakenation.com 2003). In 1872 the Sisseton-Wahpeton agree to cede the claimed land between the two modern reservations (Sisseton-Wahpeton or Lake Traverse Reservation straddles North Dakota and South Dakota). By 1883 white homesteaders had settled on the reservation. The reservation was reduced to 166,400 acres the Tribe was reimbursed for its lands. In 1887, 100,000 acres were open for sale to non-Indians. The present reservation is 245,000 acres with less than 33% owned by the Spirit Lake Sioux (Spirit Lake Nation Fish & Wildlife Dept Web 2003).

In addition to the four North Dakota Reservations it is important to recognize the Fort Peck Reservation, home to Assiniboine and Sioux. The Assiniboine were veteran middlemen in the fur trades. The French Canadian explorer, La Verendreye, accompanied a regular annual trade expedition by eastern Assiniboines to the Mandan villages in 1731-38 (Institute of American Indian Studies 1997 University of South Dakota Web). The Yantonais (Sioux) have claims to be original inhabitants of North Dakota (Schneider 1994).

The Fort Peck Reservation is home to two separate Indian nations, each composed of numerous bands and divisions. The Sioux divisions of Sisseton/Wahpetons, the Yantonais, and the Teton Hunkpapa are all represented. The Assiniboine bands of Canoe Paddler and Red Bottom are also represented (Montana-Wyoming Tribal Leaders Council, 2003). Today's reservation is located in the extreme northeast corner of Montana, on the north side of the Missouri River and covers over 2 million acres (Indian Health Service 2003). In 1851 at Fort Laramie the Assiniboine claimed land south of the Missouri River (south of the present day reservation). The Great Sioux Nation territory comprised most of the Dakota Territory. In 1868 another treaty created a reduced territory for the Sioux Nation. By 1883 the Assiniboine Tribe lost the territory of the 1851 Fort Laramie Treaty to white settlers. In 1886 Congress authorized the Commissioner of Indian Affairs to begin negotiations with the Tribes. It was

at this time that the present reservation was negotiated. In 1888 the Congress of the United States ratified the agreement, concluding three years of negotiations (Indian Health Service, 2003).

## **Euro-American History (1850 Onward) (Derived from Boughton 2000)**

The history of the area follows the overall pattern defined for the historical record of western North Dakota, as many of the defining themes are represented in the study area. Five overall themes characterize this area; 1) the exploration era with the initial arrival of Europeans in the area in the 1700s; 2) the expansion era with the ever-growing presence of trappers, buffalo hunters and military troops between 1800 and 1850; 3) the transportation era with the introduction of the steamboat and the expansion of the railroad in the mid-1800s, 4) the homestead era, starting in the 1880s and expanding after World War I and characterized by the arrival of a large contingent of German-Russian emigrants and finally 5) the coal mining era with the introduction and development of the mining industry.

### **The Exploration Era**

Pierre de Varennes, Sieur de la Verendrye was interested in establishing a fur trade monopoly for the French Crown. In 1731, de la Verendrye, with the aid of the French Crown, made a first unsuccessful attempt to travel westward across the Missouri. His second attempt in 1738 led him to Mandan country along the Missouri River.

The next fifty years would see few Europeans travel through the area. A small number were trappers attempting to establish fur-trading routes through Indian country. The introduction of a fur trade economy would lead to an ever increasing economic dependency on European goods and redefine trading networks between the various Native groups that had existed prior to the arrival of Euro-Americans. In 1793, the Missouri Fur Company was formed and a trading post was built near Fort Randall, South Dakota.

Lewis and Clark's famed expedition throughout the heartland of the continent constitutes the most noticeable presence of Euro-Americans in the general area at the beginning of the nineteenth century. Departing from St. Louis, the expedition made its way to the Missouri River in the fall of 1804, through Mandan country. The exploration party then continued on following the northwestern route of the Missouri River probably passing north of Mercer County on what is now Lake Sakakawea in the spring of 1805.

### **The Expansion Era**

With the increasing number of trappers in the area, the presence of Europeans was felt by the local Native groups, which were weary of the increase in number of strangers in their territory. The trappers were relatively friendly and were eager to exchange goods, but mistrust on both sides was apparent. Also, the frequent encounters between the growing number of Europeans and the local occupants combined with the migration of settlers from the east, led to a stronger military presence in the area. Between 1805 and 1860, trading companies built a number of trading posts that would serve as outposts for the US military along the Missouri. Fort Mandan, an original outpost of the Lewis and Clark expedition, served to establish territorial authority over the area. The construction of Fort Clark at the Knife River villages, located south of the confluence of the Knife River and Missouri River, was related to the establishment of fur trading activities in the area. Fort Berthold was established to provide protection and assistance to Mandan, Hidatsa and Arikara populations that were displaced because of epidemics. Fort Stevenson, located on the north bank of the Missouri was built for military purposes to control hostilities between Native populations. The fort also served as protection for travelers and mail carriers.

### **The Transportation Era**

The establishment of forts along the Missouri brought an additional economic boom in the way of transportation. In 1832, the Yellowstone was the first steamboat to navigate along the upper Missouri and to reach Fort Union. Built by the American Fur Company, the Yellowstone was used to transport goods in and out of the region. An increasing number of other steamboats would be seen in the years thereafter along the Missouri. As they required fuel, wood yards were established along the river. The advent of these wood yards led to the initial occupation of the area by Euro-American settlers who were mainly employed as wood yard operators.

In 1864, the United States Congress granted lands to aid in the construction of a railroad from Lake Superior to Puget Sound. Congress chartered the Northern Pacific and provided a fifty million acre land grant for its construction. While an economic failure, the railroad itself allowed settlers into the region to acquire much desired land and eventually contributed to the influx of emigrants to the area. The distribution of promotional materials in German eventually found their way to German colonies in Russia.

### **The Homestead Era**

The passing of the Homestead Act by the US Congress in 1862, which allocated 160 acres of public land to settlers

prepared to farm for a minimum period of five years, served in enticing would-be farmers to cultivate the grasslands. Homestead Patents were the major land patenting process, second only to the Railroad Patents.

This period would see one of the most important movements of population in the state's history with the immigration of German-Russians into the area. Mercer County lies in an area identified as North Dakota's "German-Russian Triangle." This region of extensive German-Russian settlement is located in the south-central and north central portions of the state. The triangle is a "truly unique ethnic enclave" for it is the largest concentration of German-Russians in the country, if not the world (Kloberdanz 1988:137).

Prior to the arrival of the German-Russians, the initial settlement of the county was slow and most settlers were from the eastern United States, although a small number came from Sweden, Norway, and Germany. The population of Mercer County was less than 300 the year before the arrival of the first German-Russian settlers. The German-Russian movement into Mercer County began in 1886, when a train of 30 wagons left South Dakota and ferried across the Missouri at Bismarck, stopping in Hebron to collect buffalo bones to replenish their supplies.

Over the next three decades, thousands of Germans from Russia came to North Dakota and many made their homes in Mercer County. In the 1900 census, the foreign-born element in the county made up 47% of the population. The German-Russians accounted for approximately 48% of this total ethnic population, which also included Germans, Norwegians and Swedes. The trend continued and the number of German-Russians far exceeded any other ethnic group (US Department of Commerce n.d.). Indeed, by 1920 it was estimated that up to 68,000 German-Russians were living in North Dakota and that 52% of the population living in Mercer County was of German-Russian origin (Sallet 1974).

By 1916, all the lands in the study area had been settled. The transfer of railroad lands to individual settlers appears to have been completed by the same time. Beginning in 1916, North Dakota had a poor wheat crop for three consecutive years and the western two-thirds of the state had below average precipitation from 1917 to 1920. Life on the Plains was particularly harsh and in the 1920s, many farmers lost their lands and abandoned the area because of difficult and austere living conditions. German-Russian immigrants, however, persevered. The majority held their land and maintained their distinct ethnic heritage into the 1940s (HASI 1983; Robinson 1966).

## The Mining Era

The strong agricultural emphasis on the local economy of Mercer County was paralleled with the exploitation of the

large deposits of lignite found in the subsurface deposits of the county. The first recorded use of coal in North Dakota is attributed to the Lewis and Clark Expedition when the blacksmith of the expedition operated his forge with lignite during the winter stay at Fort Mandan in 1804-1805. As the expedition continued up the Missouri River the following spring, coal was observed along the bluffs.

Beginning in the 1830s, steamboats on the Missouri River attempted to use coal as fuel but most attempts failed (State Historical Society of North Dakota-Archaeology and Historic Preservation n.d.). Coal was not used successfully until the 1870s when Fort Stevenson on the Missouri obtained stoves able to burn coal (Oihu 1978).

South of the Missouri and away from rivers or creeks, wood was limited and the primary source of fuel was lignite coal, which underlay most of the region. Created as a county in 1883, Mercer County had a population of 254 in 1885 (US Department of Commerce n.d.). The majority were farmers and during settlement "... fuel was a greater problem than food. . ." (Robinson 1966:160). Two types of coal mines, farmer mines and wagon mines, were common in the early settlement years of this lignite rich area.

Farmer mines generally consisted of an individual farmer collecting coal by hand or horse on his land for his own use or sharing it with his neighbors. Wagon mines were expanded commercial farmer mines and were usually stripping operations, using horse-drawn pull plows and scrapers. The owner of a wagon mine would provide coal for his neighbors or haul the coal into the nearest town to sell it commercially (Dahlberg et al. 1984; Oihu 1978). No farmer or wagon mines were identified within the inventoried area, but they probably existed during early settlement in the late 1880s (Spath et al. 1991a).

The earliest known commercial coal mine in Mercer County was developed in 1884 near the present-day town of Hazen, when local residents extracted exposed lignite from the bluffs located along the Missouri (Oihu 1978). In the first decade of the twentieth century, underground mines became the principal method of extraction for both larger-scale mines and the smaller commercial operations, with mechanized equipment for underground extraction increasing production.

In 1907, George Schmidt opened an underground mine north of the town of Beulah. (Oihu 1978). The Schmidt coal mine was the largest and best equipped mine in the county for around 10 years. In 1915, Schmidt opened another mine, called the Standard Coal Mine, which was successful for only two years when it flooded (HASI 1983).

Coal mining activity increased in Mercer County, stimulated by the arrival of the Northern Pacific Railway in 1914. The introduction of mechanical equipment for strip mining

methods in 1917 revolutionized the technology of coal extraction. Earth-moving equipment such as the steam shovel, allowed for larger-scale, less labor-intensive operations. During the 1920s and 1930s, coal production increased. Both non-mechanized and mechanized underground and strip mines remained viable methods, although strip mining predominated. Mining continued through the depression years but with reduced production (Dahlberg et al. 1984; Oihuus 1978).

By 1920, five commercial coal mines had commenced operations in the Beulah region including Schmidt mines, the Kesler Coal Mine, and the Dilger Coal Mine. The most important coal mining development was the Beulah Coal and Mining Company. By 1920 this underground mine, now called the Beulah Coal Company, was producing over 76,000 tons of lignite. Reorganized in 1922 as the Knife River Coal Mining Company, the operation developed into the largest, most technologically advanced underground mine in the United States. The mine was eventually sold to the United Public Service Company of Chicago in 1928, and then became part of the Montana-Dakota Utilities Company of Bismarck. This mine was abandoned in 1953 (Dahlberg et al. 1984; Oihuus 1978).

The 1920s also saw continuing development of commercial strip mining in Mercer County. The most notable strip mine operation was the Zap Colliery Mine that operated from 1922 to 1950. The Zap Mine used mechanized equipment and established a mining camp. The Zap Mine was the largest strip operation in western North Dakota by 1929 (Oihuus 1978). Other mines in the immediate area included the Kamins Coal Company Mine, the Lucky Stripe Mine, and a number of wagon mines operated by local farmers.

In the 1930s, many farmers reacted to the severity of the economic depression by mining their own coal (Robinson 1966). Beginning in 1940, the number of active mines began to decline, marking a turning point in the history of the coal industry. Consumption of natural gas and fuel oil surpassed coal for domestic use. Small commercial mines could not compete and government regulations made operations impossible. In the 1940s, the transformation of coal utilization into electric power production began. By 1948, most coal mined in North Dakota was being used as fuel for generating electricity (Oihuus 1978; Dahlberg et al. 1984).

The Dakota Star Mine in Mercer County was a Truax-Traer company operation. The Truax-Traer Company, one of the major strip mining companies in North Dakota, began to develop this large, mechanized strip mine in 1944-1945. Between 1947 and 1951, the mine was the state's leading producer of lignite. It served both a local, domestic market

as well as several small power plants in the region (Spath et al. 1991b). A company-owned camp was established immediately south of the mine headquarters at the Dakota Star Mine.

The Zap Colliery Mine in Mercer County operated from 1922 to 1950 with a well-established mining camp. The Dakota Star mining camp of Truax (32ME1230) was similar to the Zap mining camp. The mining camp at Truax-Traer's Dakota Star Mine was occupied until the mine closed in 1965.

The Coteau Properties Company, a subsidiary of the North American Coal Corporation, is currently engaged in the mining of coal used by electric utilities for power generation and by a coal gasification facility. Coteau's Freedom Mine in Beulah, North Dakota, began mining in 1983. Freedom Mine delivers over 16 million tons of coal per year, making it the largest lignite mine in the United States in deliveries. The operation utilizes two Bucyrus-Erie 2570 draglines for overburden removal of about 600 to 900 acres a year. That production supplies fuel to power plants providing electricity to more than 2 million homes and businesses in the Upper Midwest. It also feeds the Great Plains Synfuels Plant that converts lignite into synthetic natural gas and valuable byproducts.

In the 1970s, a consortium of energy companies obtained federally guaranteed loans to finance the construction of the Great Plains Synfuels Plant. Operations began in 1984. The consortium abandoned the plant in 1985, and DOE assumed ownership in 1986. In 1988, DOE sold the plant to Dakota Gasification Company, a wholly owned subsidiary of Basin Electric Power Cooperative.

Operations at the facility produce a synthetic natural gas from lignite coal. The coal gasification process involves the breaking down of the molecular structure of coal to produce carbon monoxide and hydrogen that are in turn combined to produce methane.

The facility is co-located with the Antelope Valley Station, a coal-fired steam electric generating plant also owned and operated by Basin Electric Power Cooperative and the Freedom Mine, operated by Coteau Properties Company.

Since coal removal began at the Freedom Mine in 1983, Coteau's miners and equipment have produced more than 200 million tons of lignite. Each year about 600 to 900 acres are disturbed for mining and an equal amount is reclaimed. Most of the soil that is stripped ahead of mining is directly spread on graded spoils immediately behind active pits.



## APPENDIX D

### ARCHEOLOGICAL FEATURES

#### (FROM PETERSON 2003)

Sites identified in the Coteau Mining Region contain stone rings, cairns, alignments, effigies, rock art, depressions, burials, and historic features such as the Ricker farmstead.

#### **Stone Rings**

The most common site type is reflected by the presence of stone rings. This property type includes all sites that exhibit stone rings or stone ring remnants (arcs). Although other features (cairns, stone alignments) also may be present, stone rings are the defining feature of these sites. Kehoe (1958, 1960 and 1961) argues convincingly that stone rings delineate discrete habitation areas associated with the use of tipis. Of the sites examined by Coteau, stone ring features are the most evident and most examined. As a result, more is known about this site type than any other.

To date, stone rings at a rate of 1 per 30 acres surveyed have been identified within the Coteau Mining Region. Within the WMA 1,285 stone rings have been recorded. The stone ring sites investigated by Coteau average eight rings per site, but this is affected by the presence of large sites that contain over 40 rings (Figure 2.2). Therefore, the median of four rings is likely to be a more accurate reflection of average site size. This is comparable to the information gathered for 20 counties in Montana (Boughton 1999). Sites that contain over 41 rings are statistical outliers and cannot be explained by random chance. This suggests that some factor (e.g., environmental, ideological) led to either very large concentrations of people or the tendency to repeatedly return to the same general location.

The cultural representatives who participated in an examination of sites in the West Mine Area generally disagree with the archaeological interpretation that stone rings usually represent the remains of a habitation structure (i.e., tipi). It has been suggested by a member of the Standing Rock Sioux Tribe that most of the stone ring features are likely fasting beds. The rings provide a conduit between the individual in prayer and the spirits above. A tribal representative indicated that all stone features are *wakan* and must be protected.

A member of the Three Affiliated Tribes indicated that women chose the location of camps. It was noted that stone circles of approximately the same size may be tipi rings, and all rings with an opening toward the east are tipi rings. Those rings that are made from rocks of differing size are talking circles. Women determined where councils would

be held and placed stones to mark the location where specific speakers should sit. A double circle marked a location where younger women were allowed to participate.

#### **Cairns**

Cairns represent the second most common type of feature observed in the Coteau Mining Region. Unfortunately, less is known about this feature type than about other stone features in the Plains. Occasionally, cairns are identified as caches or trash piles. Cairns larger than three meters in diameter, or that have high vertical profiles, represent a considerable amount of expended energy and may have played important roles, such as serving as burial markers and trail-side offering piles. For this reason, larger cairns are often investigated more thoroughly than are smaller cairns.

One hundred and eighty-seven sites in the Coteau Mining Region have cairns. Four hundred and five cairns have been recorded in the WMA. Some of these sites also contain rings and are labeled as ring sites. Others contain only cairns or are associated with stone features other than stone rings (e.g., alignments) and/or lithic debris and are identified as cairn sites. Excluding those sites that did not specify the number of cairns, 683 cairns have been identified in the Coteau Mining Region.

The accretional construction of cairns over time has been observed at a number of sites in the Northern Plains. They include Bad Pass Trail, the Rosebud Battlefield, the O'Connelly cairn, Arrow Rock and the burial at Bees Nest (Loendorf and Brownell 1980; Medicine Crow 1992; Peterson and Peterson 1995). These features are associated with trail markers (Bad Pass Trail), event markers (Rosebud Battlefield), spiritual markers (Arrow Rock) and burials (Bees Nest). A number of the cairns examined in the West Mine Area yielded diagnostics that can be attributed to more than one cultural period. These include Feature 3C at 32ME144 (McKean and Plains Village), Feature 33C at 32ME232 and Feature 9C at 32ME1589. These features also contain a number of unpatinated and heavily patinated Knife River flint flakes.

#### **Alignments**

Alignments are the next most common stone feature type in the Northern Plains. They represent meandering lines of rock that cross the prairie, often point to features or terminate at steep drainage edges.

In the Coteau Mining Region, the alignments tend to be found in very homogeneous topographic settings with no abrupt breaks. In a number of cases, these alignments are directly located in proximity to stone rings, which would suggest that their use is related to habitation camps.

Two types of alignments were observed in the new permit areas. The first type consists of a linear arrangement of rocks that can range from 3 m to 150+ m in length. Individual rocks placed in a linear manner with no observable clusters represent this feature type. This type of alignment was identified at sites 32ME230, 32ME248, 32ME1513 and 32ME1589.

The second type of rock alignment is the most common in the Plains. Sets or groups of very small “cairns” or markers that form a line represent it. This type of alignment was observed at sites 32ME170, 32ME1294, 32ME1519, 32ME1520, 32ME1553, 32ME1560 and 32ME1568. In the new permit area, the markers are composed of 3 to 25 rocks. The overall length for this type of alignment ranges between 15 and 180 meters.

Rock alignments are often identified as drivelines; however, other interpretations, such as topographic markers (Frison 1991), prayer lines and medicine wheel remnants, have also been given (Peterson and Peterson 1995). Subsurface investigations are usually unproductive (K. Deaver 1983b:2-13), and the surface manifestation of these features often provides the only clue to their function. It is normally more productive to follow alignments and determine what other features (such as large burial cairns) or cultural materials (such as a bison bone bed) are associated than to excavate the alignment.

“Alignments, linear arrangements of cairns or single stones have traditional cultural value when they are prayer lines, demarcate the direction of a prominent individual’s war or ceremonial deeds or point to ceremonial structures such as medicine wheels” (Deaver and Fandrich 1999:2-5). Additionally, stone alignments may have been built as part of subsistence activities, used as drivelines by hunters to gauge how they wanted to move herd animals into traps. Other alignments may mark spirit trails or pilgrimage trails to sacred landforms.

During the inventory of the WMA, ten sites were identified as containing 21 rock/stone alignments. These include 32ME170, 32ME230, 32ME248, 32ME1294, 32ME1513, 32ME1519, 32ME1520, 32ME1560, 32ME1568, and 32ME1589. The cultural resource representatives did not comment on the alignments identified within the West Mine Area.

## Effigies

Stone effigies are arrangements of stones intended to portray specific figures or symbols. Zoomorphic effigies (Davis 1975:32; Hoffman 1953:12) and anthropomorphic representations (Deaver and Deaver 1984:16-21) have been reported at a number of locations.

In the Coteau Mining Region, only a few of these features have been documented. A possible petroform was identified at 32ME254 (Spath and Christensen 1991). However, subsequent investigation (Winzler et al. 1998) indicates it was naturally formed. An identified petroform was recorded at 32ME1486 within the West Mine Area. It is composed of a central cairn containing 46 rocks and measuring 2 m x 2.5 m with a trail of rocks extending over a distance of 17 meters.

Site 32ME1486, commonly called “the turtle effigy” was determined eligible for listing on the National Register of Historic Places as a Traditional Cultural Property. The site contains an effigy figure that has documented uses for traditional cultural purposes for a minimum of three generations and is actively used today (Deaver 2001).

The Crow and the Three Affiliated Tribes (Mandan, Hidatsa, Arikara) regard monumental stone structures, such as effigies and medicine wheels, as having sacred attributes. The Sioux and Assiniboines consider them *wakan*. Commonly, they have mythological associations with supernatural figures that make them appropriate places for fasting, prayer and making offerings. Cairns associated with these features commonly represent offerings.

Effigies mark locations that have always been, and continue to be, appropriate places for fasting, prayer and making offerings. The patterns made by the stones are recognized as representations of the spiritual qualities of the area. For generations people have visited these effigies and conducted ceremonies. They continue to use these places today when access is allowed.

## Rock Art

Rock art consists of symbols or figures that have been painted or pecked into stone. Pictographs are rock paintings that use natural pigments, while petroglyphs use etching, incising and pecking to depict anthropomorphic and zoomorphic figures. Various designs and representations are found in rock art, depending on the intended meaning being expressed by the artist. Interpretations concerning the significance of these features have been numerous and varied. The most common is the belief that the figures were created to evoke power.

One petroglyph (32ME113) is identified in the West Mine Area. In 1974, the petroglyph exhibited a grooved profile of a hand and four parallel striations (Woolworth Research Associates 1974). By 1984 (LaVardera 1984), the hand was removed by collectors and today only the four striations remain.

For most Plains Indians, rock art sites (petroglyphs and pictographs) are almost always sacred. The art is either the product of spiritual beings, shaman or medicine people in a trance state, or they depict sacred or spiritual events or themes. From a generalized tribal perspective, all rock art sites deserve respect. Preserving the sites from disturbance by human agents shows respect. However, disturbance does not necessarily include the modern use and modification of these sites by tribal medicine people. Petroglyph and pictograph panels may be modified under very strict ceremonial conditions, usually at the direction of a spirit helper.

## Depressions

Depressions vary in form and in size and appear to have involved different excavation methods. Nine were recorded within the WMA. Some of these features are simply defined by shallow depressions in an otherwise seamless landscape; others are more complex with rocks lining their walls and in some cases defining their outline. The smaller features are circular and are less than two meters in diameter. Larger ones have irregular elliptical to rectangular shapes and measure between five and seven feet by 10 to 15 feet. The depressions are generally shallow, varying in overall depth from one-half to 1.5 feet.

The precise use of these depression features is unknown. Nor is it known if the features are prehistoric or historic in age. If they are prehistoric, they may represent quarrying activities for clay or lithic raw materials. They may also represent eagle-trapping pits or hunting blinds. If they are historic, they may represent prospect pits used to identify the depth and thickness of gravels or coal. In some cases, these features might be natural deformities in the landscape, caused by a number of interacting natural agents.

If the function and temporal affiliation of these features can be ascertained, and if they are associated with artifacts that can be analyzed, depressions may have the potential to address pertinent archaeological research questions. One depression at 32ME1551 yielded a Plains side-notched projectile and is therefore argued to be associated with a Plains Village component.

## Burials

Traditionalists do not regard burials as archaeological sites or historic properties. They see them as the final resting places of people, and as such, they should be treated with respect. Burial types commonly found in central North Dakota include cairn, mound and historic box burials. Burial cairns are generally large (10+ ft) and tend to be located on the highest points in the area. Conical mounds commonly contain more than one burial. Historic grave types included subsurface interment of individuals with or without caskets. Sometimes caskets were put in crevices and sometimes left out on the surface (Lippincott 1987).

"Burial sites are sometimes used as vision quest localities and may on occasion contain sacred objects such as medicine bundles" (Deaver 1986:117). Offerings, such as prayer stones, beads, and tobacco, may also be left at burials. Not all burials, however, have physical markers, and therefore, some may be difficult to identify.

Human remains do not need to be present for a location to be a final resting place. Cairns are sometimes made to ensure that a person returns. If that individual should die while away from his homeland, the cairn will ensure that the spirit will return to its home. Those markers without human remains are no less sacred than those that are associated with human remains.

Site 32ME108 within the West Mine Area contains human remains. None of the cultural representatives feel that it is appropriate to remove human remains. Every attempt should be made to protect them. Human remains should be removed only when no other alternative is possible, and they must be placed in a safe place. The new location must be protected from any future intrusion.

## Historic Barn

Within the Ricker farmstead (32ME189) is a barn that embodies a German-Russian construction style that used native stone. German-Russian immigrants that homesteaded central North Dakota during the early 1900s brought this style. Few buildings utilizing this style of construction are extant in the region. As such, it reflects a rare example of the German-Russian vernacular construction techniques.

Avoiding this building is not a feasible option, and it is unlikely the building would survive transport. To mitigate the impact of mining, Historic American Building Survey documentation would be conducted. This documentation would include a scaled drawing and archival photography of the building. In addition, archival documents would be examined and local residents interviewed to explore the use of German-Russian vernacular construction techniques.



# APPENDIX E

## AMERICAN INDIAN TRADITIONAL CULTURAL VALUES (FROM DEAVER 2001)

### Historical Context

The project area lies within the historic range of the Hidatsa as defined by 1) Hidatsa oral histories and sacred texts; 2) the Fort Laramie Treaty of 1851; and 3) current scientific reconstructions of Hidatsa prehistory and history (see Bowers 1948; Wood 1967; Winham and Lueck 1994; Toom 1988). The historic Hidatsa once consisted of three distinct groups. Two groups, the Hidatsa-proper (People of the Willows) and the Awaxawi (Village on the Hill), moved into the Missouri valley relatively late (circa 1500 AD). The third group, the Awatixa (Village of Scattered Lodges) traces their origin to the Missouri River near the mouth of the Knife River (Ahler et al. 1991:28). The ancestors of the Three Affiliated Tribes have been in the project area longer than any other tribal group (Winham and Lueek 1994). The Hidatsa-proper were called the Minnetaree (People Who Crossed the River) by the Mandan during this historic period and are ancestral to the River Crow. In some historic sources, the Awaxawi are also sometimes referred to as Minnetaree, as well as Amahami and Saultier. The term Gros Ventre is sometimes used to refer to all three groups or just to the Hidatsa-proper (Deaver 1986; Schneider 1986).

Today, the Hidatsa are one of three tribes, along with the Mandan and Arikara, who make up the Affiliated Tribes of Fort Berthold. Although the Affiliated Tribes maintain separate ethnic identities and communities on the reservation, they share many cultural patterns that serve as a basis for all three groups' interest in the project area. In addition, the Crow maintain an active interest in the project area due to their historic and spiritual ties to the Hidatsa. They continued to make pilgrimages from their reservation in Montana to sacred sites (e.g., 32ME59, Grandmother's Lodge) near the project area as late as the 1950s (Deaver 1986:83-103). The Hidatsa and Crow continue to regard each other as relatives. Generally, as a matter of courtesy and respect, the Crow usually defer to the Hidatsa regarding the treatment of North Dakota sites.

Nomadic Plains groups, the Assiniboine, Chippewa/Ojibwa, Cheyenne, Yanktonai and Sioux also moved through Central North Dakota in the last 200 years. They raided, traded, and occasionally allied themselves with the Mandan, Hidatsa and Arikara. The documentary record for the Yanktonai presence in the project area is most complete.

A Lower Yanktonai winter count indicates the Yanktonai penetrated as far west as the Missouri River by 1724, when

an encampment was made on the lower Grand River, South Dakota (Howard 1976:28). Yanktonai winter camp locations described in the John K. Bear winter count range northwest from the lower Big Sioux River to the middle James River, and from there, west across the Missouri River to the Killdeer Mountains of West-Central North Dakota (Howard 1976:28- 41).

Some Yanktonai were in the Killdeer Mountains from 1760 to 1830. From 1831 to 1860 these Yanktonai lived in the village site across from Washburn known as Ice Glider (Howard 1976; Wood 1986). "Upper Yanktonai informants have told me that their people hunted and wintered on both sides of the Missouri as far north as Painted Woods, near present Washburn, North Dakota" (Howard 1976:5). They considered these areas on the border of their territory.

The relationship between the Yanktonai and the Mandan, Arikara and Hidatsa was complex and changed over time. Episodically they shifted from being enemies to trading partners and allies--they intermarried and occasionally the Yanktonai fought side by side with the villagers against the Teton Sioux.

The historic ceremonial activities of the Mandan, Arikara and Hidatsa have been described in detail by ethnographers (Bowers 1950, 1965; Schulenberg 1956; Will 1928, 1930a, 1930b). Furthermore, they have been compiled and explicitly related to archaeological manifestations and TCPs (Deaver 1986; Deaver and Manning 1992).

### Hidatsa and Mandan

According to Hidatsa religious discourse, all supernatural powers have their origin at the beginning of time when the earth, or "in between" land, was formed. During the formation of the earth, First Creator and other mysterious figures created a number of supernaturals from which the Hidatsa could acquire power and, consequently, ensure their continuing existence by performing particular rites. These powers are acquired through vision quests. In the case of the Hidatsa, older brothers took younger ones to fasting centers when ceremonies including fasting and personal sacrifice were practiced (Bowers 1965:290- 295).

The Hidatsa, like the Mandan, performed a series of bundle ceremonies on a calendrical basis to ensure the universe would continue to function properly. Like the Mandan, the Hidatsa conducted many of these group ceremonies in their

riverine villages. However, some bundle ceremonies needed to be conducted in upland locations.

Whereas offerings to the spirits represented in sacred bundles were ordinarily placed on poles within or adjacent to the summer villages, offerings made to the Earthnaming bundles were placed near the various buttes while out of the villages on summer buffalo hunts. Of these buttes, four were known as "Buffalo Spirit Places": Buffalo Comes Out Butte, Singer Butte (Killdeer Mountains), Buffalo Home Butte, and Rosebud Butte. At each of these buttes, offerings of feathers from the speckled eagle were made to increase the buffalo herds. The feathers were tied in bundles to buffalo skulls and placed near caves situated under overhanging cliffs\* \* \* (Bowers 1965:436). The area defined by the "Buffalo Spirit Places" encompasses the project area and so the Earthnaming Bundle provides a clear link between the landscape of the project area and the spiritual qualities of the earth recognized by the Hidatsa.

Effigies found in the uplands also provide a material culture link between Hidatsa and Mandan theology and the landscape. Most effigies were boulder outlines of turtles and snakes. Generally, they are located on high bluffs along the Missouri River. The head of the turtle effigies point to the river. Historically, cairns associated with these effigy figures are related to individual offerings made to clear fogs so that buffalo herds could be found (Bowers 1965:337n):

The next night we camped by a circle of stones in the form of a turtle. The gods had arranged these stones, the older men said, for none living had ever seen one of these effigies made. There was a hill nearby and on it was a pile of rocks. The turtle's head was pointed to the river because the turtles stay in the water so the gods must have arranged all the turtle outlines that direction. . . Anyone could make offerings of knives, pieces of hides, or dry meat and other things to eat when asking for rain or other good luck such as living to be old. If they had children they would ask the gods that go with the turtle to send good luck. To give to the turtle was the same as giving to all the other gods that went with the bundle (Crows Heart in Bowers 1965:370).

Historically when away from the riverine villages, the owners of the Big Bird, Missouri River and the Creek bundles performed hunting ceremonies at various stone effigies associated with these bundles (Bowers 1965:369-370).

## Arikara

Arikara ceremonies like that of the Mandan and Hidatsa centered on ceremonies associated with sacred bundles. None of the ceremonies could be performed until at least one, and preferably more, of the bundles was opened on the altar at the back of the sacred lodge. Only those that owned the bundles had the sacred knowledge required to perform

these ceremonies. All ceremonies were preceded by a one-day rite of purification known as the Sage Dance, which included fasting and ritual bathing in a sweat lodge. The Sage Dance required white body paint obtained from special clay in the Little Missouri Badlands, which was used at no other time (Will 1930a:247-249 and 1928:56).

Arikara ceremonial lodges are associated with large boulders. According to Howard (1972:299-300), the Yankton, other Dakota groups and the Arikara viewed large boulders as sacred/*wakan*, and the locales of these stones were regularly visited for prayer, prophecy and ceremonies. Two of the best-known examples of these sacred stones are the Tunkan or Oracle Stone [originally located near the mouth of the Turtle River near Redfield, South Dakota] and the revered *Inyan* bosdata or Standing Rock, now located at Fort Yates, North Dakota. According to Howard, both of these were originally Arikara monuments or shrines:

In each of the Arikara villages there was a sacred stone in front of the sacred or ceremonial lodge where the tribal bundles were kept. This stone represented Chief Above, the Creator. Beside it stood, during ceremonies, a cedar tree which represented Mother Corn, who had led the people from their original homeland underground. . . It would seem likely that these sacred stones, left behind by the departing Arikara, would be treated with veneration by the Dakota invaders . . . who would weave their own interpretations about them (1972:299-300).

## Sioux and Assiniboine

Historically, the most basic spiritual concept for all of the Sioux groups and the Assiniboine is *wakan*. There is extensive literature devoted to *wakan* in Siouian thought and theology (Rodnick 1938; Densmore 1918; Brown 1983; DeMallie 1984; Dorsey 1894; Huitkrantz 1981f; Feraca 1963, Neihardt 1961; Powers 1975, 1982; Howard 1984 and Walker 1917). Linguistically the term is made up of two particles wa- and kan.

According to Little Wound and George Sword, "Wa means anything which is something." *Wakan* means something that is kan. "Kan," according to George Sword, "means anything that is old that has existed for a long time so that should be accepted because it has been so in former times or it may mean a strange or wonderful thing or that which can not be comprehended or that which should not be questioned or it may mean a sacred or supernatural thing. . ." (Walker 1983:27).

In Sioux and Assiniboine theology, the *wakan* can be manifested in particular topographic features, e.g., cliffs that contain round rocks. Monumental stone features such as medicine wheels (Deaver 1982; Kehoe and Kehoe 1959) and stone effigies (turtles and snakes) are often used or inter-

preted as marking *wakan* areas (Deaver 1981; Howard 1972). The *wakan* may more easily be contacted in certain locations. Therefore, vision quest sites are associated with isolated topographic features, particularly in the rugged topography of mountains and hills and around large bodies of water and isolated islands. At least two kinds of rocks are *wakan*. One is like an ordinary stone, but it makes you pick it up so that you can recognize it by its special shape (Lame Deer and Erdoes 1972:101); and the other are tiny ice like rocks collected from anthills (Lame Deer and Erdoes 1972:123). Walker also specifically notes that cliffs with round rocks in them and rock are *wakan* (1980:101-103). Rock art is *wakan*. This is often because it marks the site of a vision quest and/or depicts supernatural events and/or communication (Deaver and Fandrich 1999).

Howard's description of Yanktonai eagle trapping indicates that the ritual closure of the pit may generate a stone ring with a diameter of 10+ meters:

After the trapper had removed the feathers from his eagle, or eagles, he returned to his eagle-trapping pit, bearing the remains of the bird encased in sage. This he placed in the center of the pit, together with the stuffed rabbit skin lure. The eagle carcass was placed on its back, the head to the west, and tobacco was sprinkled over it. Stones were then placed upon it and the pit was filled in. A circle of large stones, about thirty-five feet in diameter, was laid around the area, designating it as an *owanka wakan*, or "holy place." Judge Zahn commented that many of the so-called "tipi" rings derived from this custom, and pointed out that many of these are situated on high bluffs, which would be ideal for eagle trapping sites but very poor as camp locations (Howard 1954:73).

All Sioux groups and the Assiniboine practiced the vision quest whereby an individual petitioned the *wakan* for aid. The vision quest included preparatory ritual purification (usually involving a sweat bath), preparation of the fasting locality, isolation of the individual from the community for a set period (commonly 4 days), making offerings to the *wakan* (tobacco, calico flags, flesh, sweet grass, sage and so on), fasting and praying. Preferred localities for vision quests for all the Sioux groups and the Assiniboine are secluded. Generally, the most common localities are isolated topographic features such as buttes, hills, cliffs, ledges and so on. Locations near water, and hence, the Underwater Powers were also commonly used as sites for vision questing (Deaver 1981; Howard 1984; Powers 1975, 1982; Rodnick 1938).

Successful vision quests can result in the petitioner receiving communication from the *wakan*, including directions for collecting material items to be used as personal insignias of power. When collected, these items make up the personal medicine bundle. Common components of medi-

cine bundles are pipes, eagle feathers, stones, pigments, plants etc. These items have associated sacred texts, songs, dances or dance steps and rules concerning their use and curation. The only bundle resembling a tribal medicine bundle is the Buffalo Maiden Calf Pipe Bundle. This bundle was given to a culture hero along with seven ceremonies including the Sun Dance (c.f., DeMallie 1984; Feraca 1963; Neihardt 1961; Powers 1975).

Both the Assiniboine and Sioux build and use sweat lodges prior to vision questing (Powers 1975:90; Rodnick 1938:30). Additional individual activities directed toward petitioning the supernatural include placing offerings (stones, tobacco, cloth flags) in remote locations (Deaver 1981:3.16; Dorsey 1894:448-449; Howard 1984:104-105; Powers 1975:50 and 1982:14; Walker 1980:101-103) and the collection of holy rocks by spiritual specialists (Lame Deer and Erdoes 1972:101, 103).

The Sun Dance of the Teton and Assiniboine, like that of the Yanktonai, includes a great amount of ritual diversity. Each Sun Dance leader uses his experiences and visions in order to structure the ritual. There is no one accepted form of the ceremony. The aboriginal Assiniboine and Teton dance lodges were constructed by combining several tipis (Lowie 1910; Mails 1973; Rodnick 1938). The modern Teton lodge is constructed of two rows of forked ash posts that form concentric circles with an opening to the east. These posts are joined with saplings and pine trees and brush is laid across them to form a shaded area where spectators will watch and participants will occasionally rest. The diameter of a contemporary lodge is approximately twenty-five feet, but may vary widely (Powers 1975:66). According to Feraca, the interior of the dance lodge is completely open to the sunlight and the spoke-like rafters radiating from the center pole. Common to other Plains tribes, dance lodges have never been a feature of the Teton Sun Dance lodge (1963:13). As is the case with other Plains tribes, the lodge is not torn down after the ceremony. It is left to deteriorate from exposure and thus return to Mother Earth (Powers 1975:100).

Today, the Sun Dance, the sweat lodge, the *Yuwipi* ceremonies and the vision quest are the centerpoints of traditional religion. In addition, for many Sioux and Assiniboine they are symbols of ethnic identity as well (Deaver 1981; Mails 1978; Powers 1975, 1982).

## Tribal Perspectives

The descendants of the Mandan, Hidatsa, Arikara, Sioux and Assiniboine who follow traditional embrace a world view that emphasizes the inter relationships between the past and present, the living and dead, the people and environment and the spiritual and physical aspects of life. Time, from this perspective, is not only a chronological ordering of events, but it also has a quality and texture, which exists in the past, present and future.

Time, or more accurately tradition, establishes the rationale and basis for living in the proper fashion. From this perspective, there is often an intimate relationship between a person and his past. Time, or the past, provides a template for the proper way of life. It legitimizes the present by showing it is related to things that have gone before. The spirits present at the creation of the world continue to be present in the landscape today. This is why a person making a fast today, or a Yuwipi man during a ceremony, can communicate with the spirits and be given guidance. This guidance can include direction for the appropriate treatment and interpretation of stone feature sites.

The location of a cultural place (archaeological site or historic property) is interpreted as evidence that ancestors recognized the physical and spiritual characteristics of the landscape, which made it an appropriate place to camp, fish, hunt, gather, fast and so on. Because Indian people today can still recognize these same physical and spiritual characteristics of the landscape, there is a continuing tie between the people and the landscape of yesterday and today. It is this sense of relationship that is important.

A connection to one's ancestors is highly valued. Consequently, cultural places must be shown respect. People visit cultural places, sometimes praying and making offerings. This allows them to renew their ties to these places and the historic landscape in general. In other words, these cultural places become the focus of pilgrimage. The spiritual and physical qualities of the place, as well as its traditional cultural use, are important characteristics that transcend time.

The most important change in the Affiliated Tribes relationship to their land base in modern times came with the 1955 construction of the Garrison Dam and the subsequent inundation of the Missouri River bottomlands. The Garrison project reduced the land base of the reservation by 150,000 acres. More importantly, the flooding destroyed Like-A-Fishhook, Grandmother's Lodge and other traditionally important cultural places. It flooded cemeteries, traditional shrines and literally all of the reservation communities. Ninety percent of the reservation inhabitants were forced to move (Schneider 1986:105-106).

The construction of Garrison Dam forever changed the Affiliated Tribes relationship to their spiritual, cultural and physical environment. Not surprisingly, those sites that were not flooded have become even more important because they represent heritage and spiritual ties to the land that are seen as endangered. Sites in the project area have great significance to the peoples of Fort Berthold. The creation of Lake Sakakawea combined with extensive lignite mining and intensive mechanized agriculture has greatly limited the number of sites that the Indians with historical cultural ties to western North Dakota can access to renew their ties to the landscape. Further, those sites now remaining have already been impacted because the meaning of places is partially

derived from their association with other places. Thus, places assume a great significance in Indian history. Many locations are sacred because of the events that occurred there or because the supernatural seemed to be very close at that site. Warm springs or unusual rock formations were obviously areas of special power that figure prominently in Indian histories (Schneider 1986:46).

Children are taught the traditional cultural significance of these special places:

... it was the custom of many Hidatsa families to return to living sites and to point out to the younger people the depressions of lodges where certain relatives had lived, their graves or earth rings on the prairies where various ceremonies such as the Naxpike or Wolf ceremonies were held (Bowers 1965).

The traditional descendants of the Hidatsa, Arikara, Mandan and Yanktonai recognize both spiritual and physical qualities of the project area landscape. This includes various places recorded as archaeological sites.

Like their ancestors, contemporary traditionalists believe that when they live in a place they must harmonize their actions so that their actions are both physically appropriate and spiritually compatible. Today, as in the past, when a young person goes to fast, he consults with his Elders who direct him to locations that are physically appropriate, relatively isolated, private, secure and spiritually appropriate, a place known for the presence of spirits. A tribal consultant was directed by his father to go to a site in the project area to fast.

According to Hidatsa, Arikara, Mandan and Yanktonai beliefs, their ancestors, who lived in and traveled through the project area, also recognized the same spiritual and physical characteristics Indian people recognize today. They chose their campsites, set up their tipis, made tools, hunted buffalo and deer, collected plants, buried their dead, fasted, prayed and held council meetings in places that were spiritually compatible as well as physically appropriate for these activities.

Consequently, when the tribal cultural representatives are asked to evaluate sites, they look first where the site is on the landscape. They discuss the landscape in general and phrase their responses and evaluations in terms of both physical and spiritual characteristics of both the landscape and the material culture (features, lithics, etc.) used by archaeologists to define sites.

Stone feature sites are common in the project area. The tribal cultural representatives describe and evaluate these sites in terms of both spiritual and physical reasons why stone feature sites are in particular locations. They recognize the same sort of physical variables as those recorded by archaeolo-

gists, such as distance to water, availability of plants, panoramic views of the area and so on. Additionally, site location/distribution patterns are read as physical representations of traditional beliefs. For the Yanktonai, for example, the location of ring sites relative to drainage patterns follow and mirror the spiritual pathways described in their creation stories.

## Traditional Cultural Values, Stones, and Stone Feature Sites

Throughout their history, stones have been ceremonially important to all of the tribes involved in this project. Sacred stones recognized by the ancestors of the Three-Affiliated Tribes have been recognized, respected and honored by the later Siouian peoples as they moved in the area. Siouian peoples incorporated Arikara oracle stones into their belief systems because they had always-recognized *Inyan* (Stone), the Grandfather, and the first supernatural created by the Great Mystery. The sacredness or spiritual qualities of the stone features in the project area are part of the same tradition that recognized the sacred stones in Minnesota and eastern North Dakota.

This natural object [Rock *eya* (Sioux), *mih* (Mandan)] had physical properties as well as spiritual properties. From a physical point of view the Rock can protect you-to hide behind it in a storm or fight; it can cure you- heat them up to use during Sweat Ceremony; it can harm you-if someone threw one at you. From a spiritual point of view the rock can protect you-many individuals wear a small Rock in a pouch around their necks for protection against certain spiritual forces; it can cure you -certain Rocks can be rubbed until warm then used to touch certain ailing part of the body. In this way the Rock is a silent teacher. (Project Consultant, Personal Communication 2001)

Single stones, called glacial erratics by geologists, have long been recognized by the Sioux as having important spiritual attributes. They were used as a shrine where prayers and offerings were made. Even when forced to leave areas, the Sioux took measures to insure that these stones were treated respectfully. In this view stones are essential to spirituality. They are used in prayer. People communicate with *Inyan* through rocks. Stones are active in ceremony and must be respected (Project consultations, Personal Communications, 7/11-12/2000; see also Walker 1980).

According to Finger, a Lakota shaman interviewed by James R. Walker in 1915 on Standing Rock, *Inyan*, the Rock, was the first supernatural in existence. He is the grandfather of all things. *Inyan* is a part of a complex and intricate theology through which Lakota spiritual specialists or medicine people understand the world and their place in it. As in other communities, detailed theological knowledge is limited to people like Finger who devote their lives to its understanding. Traditionalists recognize that Rock or *Inyan* is a powerful spiritual being. He is prayed to and addressed as Grand-

father. He is offered red prayer flags along with tobacco. He is recognized in the stone features found over the prairie, including the project area. Stone features are both a symbolic representation of His presence and a physical marker of His significance in the world. *Inyan* is the primal source of all things. People still pray and make offerings at stone features today.

Stone rings are powerful places. "When a person fasts in a circle [of stone], it is as if you are buried alive. You may not come out alive" (Tribal Consultation, Personal Communication 6/12/2000). Accordingly, rings provide a conduit from the person praying to the spirits above and there are potential spiritual consequences of going to the stone feature sites.

Stone features, described by archeologists as petroforms or effigies, are read as physical symbols of the continuing relationship between the spirit world and that of man. Effigies mark locations that have always been, and continue to be, appropriate places for fasting, prayer and making offerings, i.e. communicating with spiritual beings. The patterns made by the stones are recognized as representations of the spiritual qualities of the area. For generations people have visited these effigies and conducted ceremonies. They continue to use these places today. The tribal cultural representatives regard continued access to these sites as critical to their continuation as a people.

Cairns, stone piles created by men, may represent many different activities. They may be trail markers or contain burials. When grouped in lines they may be drive lines associated with hunting activity or prayer lines when associated with ceremonial activities. Cairns may be built all at one time or may be added to over the years by many different peoples. Cairns may hold offerings. Generally, the larger the cairn and the higher its profile the more likely it is to be associated with human remains or a particular ceremonial activity (Deaver 1986).

According to some traditional Sioux, all rock art is *wakan*. Further, it is in the male ceremonial realm.

Plants and animals are not spoken of as natural resources. Rather, they are described in biographical terms, as relatives. They are conceptualized and treated as persons. They are talked with and offered tobacco. They are part of the same community as humans. Just as the plant and animal people have a responsibility to provide food for the human community, humans have the responsibility to ensure that the environmental conditions suitable to sustaining the plants and animals are maintained (see King 1999 and Davis 2000 for similar concepts among the Chippewa/Ojibwe).

Early in the discussions with tribal representatives, a great deal of interest was expressed in the plants found in the project area. They were interested in seeing native plants being used in the revegetation plans and getting access to harvest traditionally important plants.

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